Call-A.P.P.L.E.™

Volume V, Number 7 July 1982 $2.50 ($3.00 Canada, £1.75 UK.)

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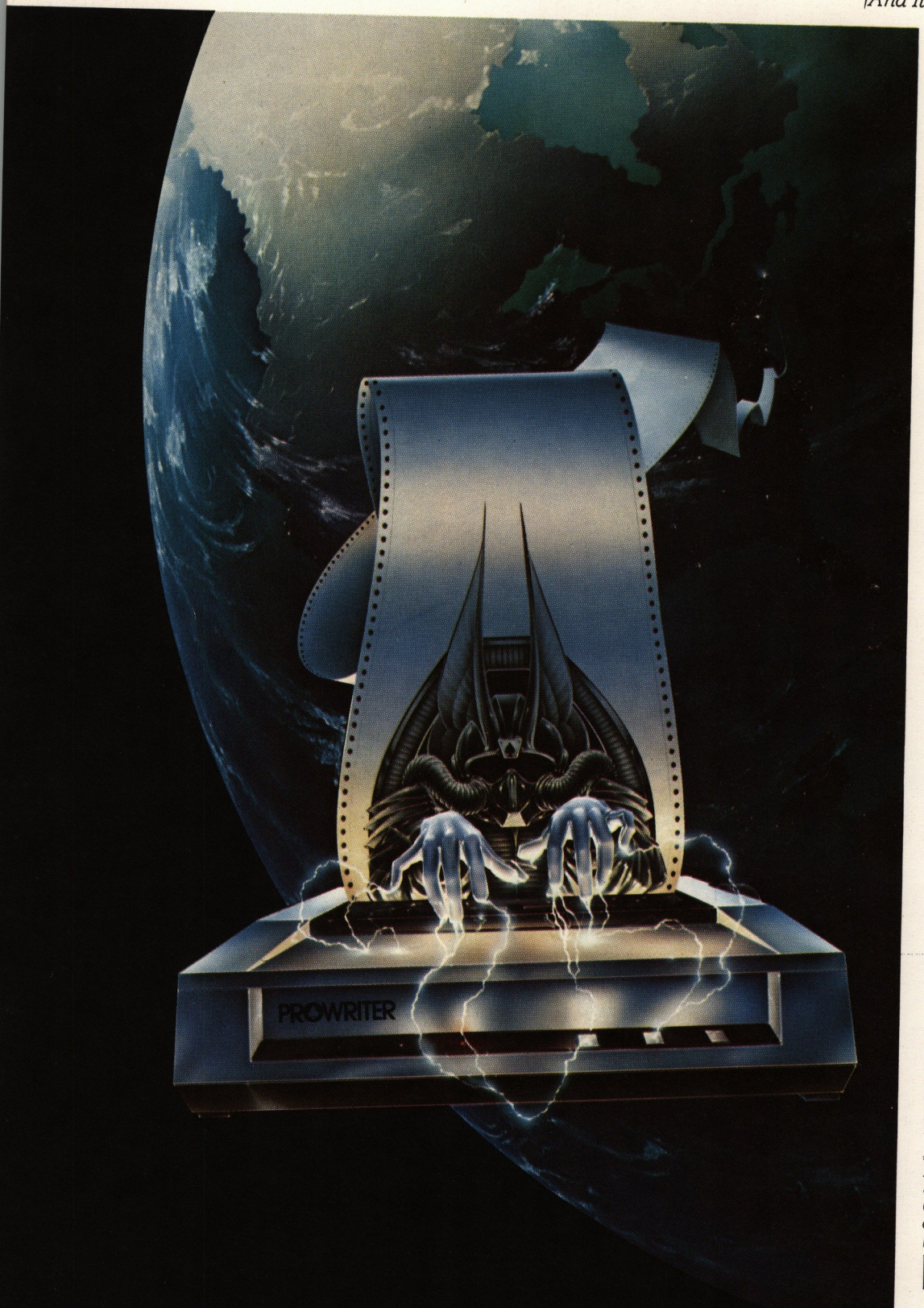
Apple PugetSound Program Library Exchange

THE PROWRITER COMETH.

(And It Cometh On Like Gangbusters.)



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7:30 PM, Tuesday, July 20th, 1982

Omega/Bellevue
835 106th N.E., Bellevue

Guest Speaker
Wayne Erickson/DB Management

Special Meeting
7:30 PM, Tuesday, Aug. 3, 1982

Guest Speaker
Mike Markkula/President Apple Computer, Inc.
Contact office for reservations

7:30 PM, Tuesday, August 17, 1982

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Call-A.P.P.L.E.™

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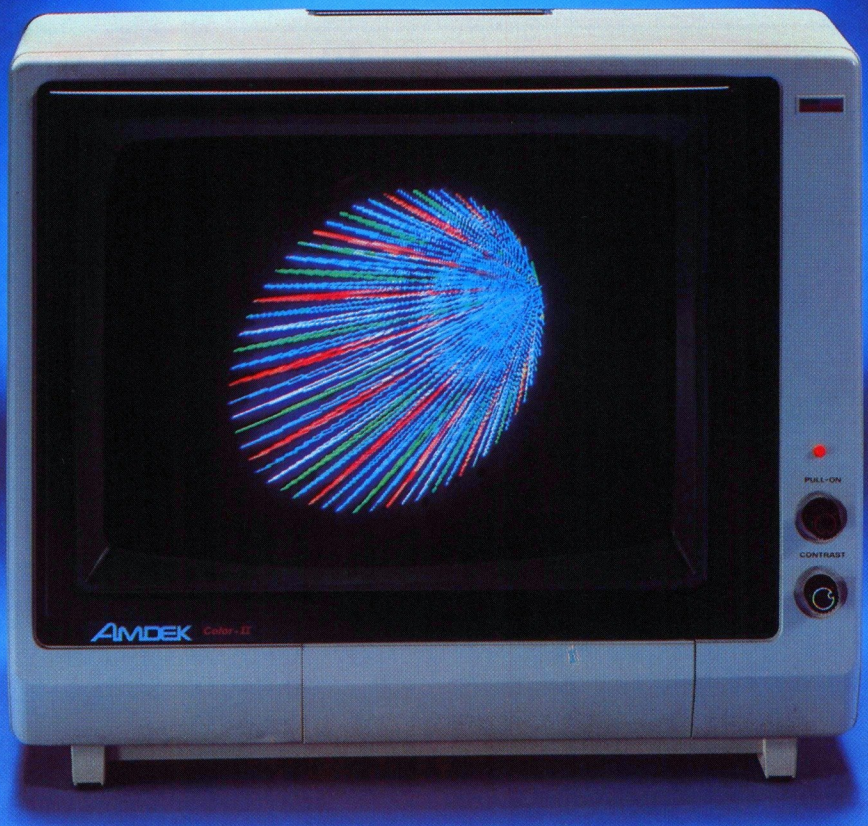
The High-Resolution Color Monitor for Apple II



Amdek's new Color-II monitor with DVM interface board

No video monitor has ever combined Apple II compatibility with exceptional performance like the new 13" Color-II monitor from Amdek.

Color-II features our optional new DVM peripheral board for easy interfacing with your Apple II. And look at the other top-of-the-line features Color-II offers:

- RGB, TTL input for high resolution graphics.
- 80 x 24 character display capability (with expansion card by Vydec).
- 560 (H) x 260 (V) resolution.
- Molded-in carrying handle for easier portability.
- Front-mounted controls for faster fine-tuning.

So if you want to get the most from your Apple II system, get the "most" monitor. Ask your dealer about Amdek's new Color-II monitor with the optional DVM interface board.

What is DVM? The DVM, or "Digital Video Multiplexor," is a low cost interface that allows the Apple II computer to be used with an RGB monitor, such as our Color-II.

Amdek's DVM is software programmable to allow transparent operation, and is parallel with existing Apple text and graphic modes. Three of its channels are used to multiplex the existing Apple text, low resolution and high resolution graphics. The 4th channel allows the use of an 80 character line video board.

Our DVM is also color channel software programmable, enabling you to turn the three color channels on or off by software control. For example, the red and blue channel can be turned off when the 80 character channel is turned on, resulting in a green phosphor video presentation.

For convenient operation, the DVM board may occupy any slot in the Apple II. The DVM also features low-power consumption and low-power schottky logic.

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THE EDITOR BYTES BACK

the editor

JULY brings with it thoughts of swimming holes and balmy summer nights; to computer buffs it is an opportunity to head for the [usually freezing] basement and catch up on postponed programming projects. Now is the time to type in **David Deever's Dual Drive Master Create** or **Binary to Text Save** by **Dave Lingwood** and ourselves. Or, if its plain just too hot, you can find your favorite shady spot, pour a tall one, sit back, relax and devour this month's offerings.

Ralph Swerdlow, whose **A IS FOR APPLE** series is absolutely indispensable for novices, provides instructions on how to use **EXECutive Text Files,** unravelling a hitherto unexplored mystery. **Tom Little** continues his exploration of the **World of Apple** with Part 2 of **Ins and Outs,** where he delves into the intricacies of Apple's I/O operations.

For a tutorial, let us recommend **Dave Huffman's Examining Directory Sectors,** if learning more about DOS is your bag. On the other hand, if your interest leans more to applications and word processing, take a look at our continuing series of word processor reviews, hosted by **Jeff Finn.** This time around around, reviewers **Traci Wynn Collins** and **L. K. Bumgarner** look at **Executive Secretary** and **The Correspondent,** respectively.

In brief, those are our cover stories, but far from our total offering. Our European consultant **Cornelis Bongers** returns with the solution to his **So What did you Expect** from last month, in **Unraveling an Applesoft Puzzle;** as usual, his explanation is impeccable. Furthermore, for those readers interested in a preview of Apple's **Super][,** Bongers has submitted an in depth review of the German **Basis 108,** which will appear in the August **Call -A.P.P.L.E.**

If you've gotten tired of swapping diskettes in the drive everytime you run **Master Create, David Deever** has the solution with his **Dual Drive Master Create.** For those of you whose machines sprout wings whenever an 80 column card encounters an inverse catalog, **Glen Bredon** has a patch to DOS to solve the problem in **DOS Patch for 80 Column Cards.** This applies not only to copies of **Big Mac.LC** that were shipped out, but to any 80 column card having problems with inverse characters.

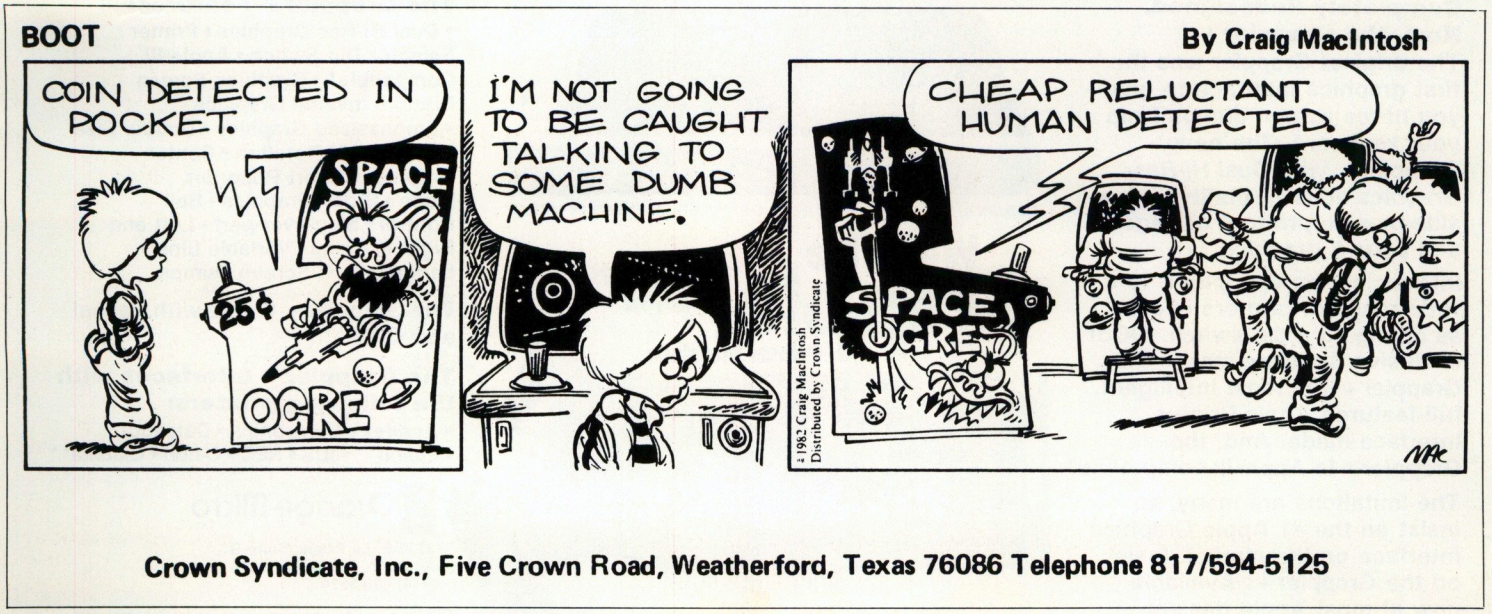
Last month we gave you a sneak preview of our new feature: **Tomorrow's Apples Today.** This time we have a number of interesting items, mostly gleaned from our journey to the Boston Applefest. Each month we will try to report on a select group of new and unusual products. Members should note, however, that publication of these items does not imply our endorsement. It is suggested when a member finds an item to fit their needs, that they investigate thoroughly, both this and competitive products, through their dealer and/or product distributor.

That's only half the story. The whole story can be found by flipping back a page to see what else we have cooked up for you on the menu.

We would like to remind our readers again that they can get a copy of our **Author's Guidelines** by sending a self-addressed envelope with .37 postage to the editorial office. Our page rate remains $50, and we pay a $15 minimum for material submitted for our **Call -A.P.P.L.E. Quickies** and our **So What did you Expect** features.

As a last word, don't pass by those "So What's," there is a lesson in every one. See you next issue.

INTRODUCING



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NEW

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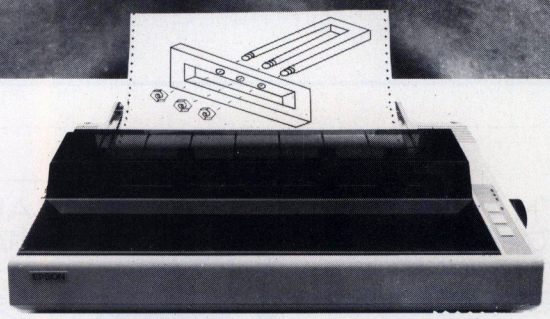
Completely Redesigned. Now, the Grappler+.
The original Grappler was the first graphics interface to give you hi-res screen dumps from your keyboard. The new Grappler+ with *Dual Hi-Res Graphics* adds flexibility with a side-by-side printout of page 1 and page 2 graphics.

Interfacing the Grappler+ to a wide range of printers is easy as changing a dip switch. 4K of exclusive firmware makes the Grappler+ the most intelligent, full-featured Apple Printer Interface made. And, the Grappler+ is Apple III compatible.*

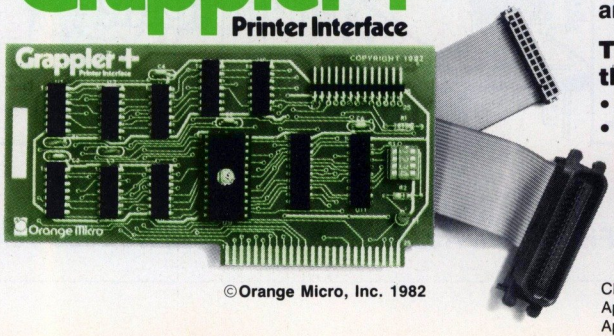
The imitations are many, so insist on the #1 Apple Graphics Interface on the market. Insist on the Grappler+. Available now at most Apple dealers.

*Requires additional software driver.
**Requires graphics upgrade.



ACTUAL APPLE II PRINTOUT USING GRAPPLER™ AND EPSON MX100

With The Grappler+™ Printer Interface



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The Grappler+ Features:
• Dual Hi-Res Graphics • Printer Selector Dip Switch • Apple III Compatible* • Graphics Screen Dump • Inverse Graphics • Emphasized Graphics • Double Size Picture • 90° Rotation • Center Graphics • Chart Recorder Mode • Block Graphics • Bell Control • Skip-over-perf • Left and Right Margins • Variable Line Length • Text Screen Dumps.

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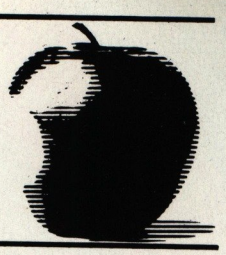
BYTES FROM A.P.P.L.E.



Val J. Golding

GLOBAL Program Line Editor is our big story for this issue. GPLE debuted at the Boston Applefest and, so we have been told, was the "hit of the show." We had a sign up at our booth which read: "You've seen the rest, now get the best." No exaggeration, this, no wild promo. Simply stated, GPLE is without peer.

We have pretty much kept the original PLE in memory whenever our system is up; we would never want to be without it. Now, with the addition of global line edit, search and replace, plus typeahead, 80 column compatibility and 1100 bytes of escape functions definable from the keyboard, GPLE too will become our pride and joy. Member price for Neil Konzen's boon to editing is $38.50.

Next item is one we have been deluged with inquiries on, after members read "Keep your Cool" in the May issue, "...where can I get a fan"? We have the answer to that one in the **Ap.Coolkit.** Specially priced for our members at just $22.50, Ap.Coolkit contains a slow speed Torin fan, a line cord and mounting tape. Give this some serious consideration if you are running into heating problems.

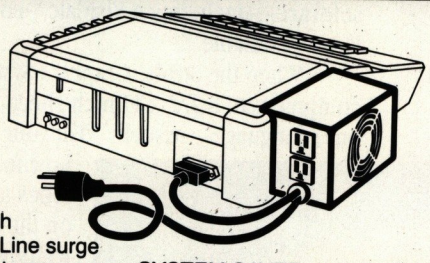
If your subscription to *Softalk* is about to run out, watch for our forthcoming mailer, which will announce a very, very special renewal rate for A.P.P.L.E. members.

Lastly, we are pleased to announce the coming availability to our members of **A.P.P.L.E. Source,** a special closed system of the Source Telecommunications, for access by members only. There will be special features designed strictly for A.P.P.L.E. members, and members who already belong to the Source only need contact us to gain access to the closed system. Best of all, members who sign up now for the Source will receive a 25 percent discount from the regular Source initiation fee. Watch this spot next month to find the effective date of this new service.

Make your Apple II® shine with all new SYSTEM SAVER™

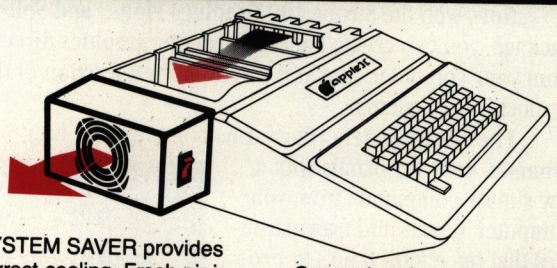
- LINE SURGE SUPPRESSION
- QUIET COOLING FAN
- DUAL AUXILIARY OUTLETS
- FRONT POWER SWITCH

COLOR MATCHED. SIMPLY HANGS ON APPLE.



Power input through SYSTEM SAVER. Line surge suppression protects programs and data by smoothing out dangerous power surges and spikes.

SYSTEM SAVER contains two switched power outlets. You can control your printer and monitor from the front mounted switch.



SYSTEM SAVER provides correct cooling. Fresh air is drawn across the mother board, over the power supply and out the ventilation slots.

Convenient front mounted heavy-duty power switch with pilot light. Switch controls SYSTEM SAVER, Apple II, and both rear outlets.

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When ordering by mail include payment of $89.95 plus $2.50 for handling. New York State residents add 5¼% sales tax. By phone payment can be charged to VISA or MASTERCARD.

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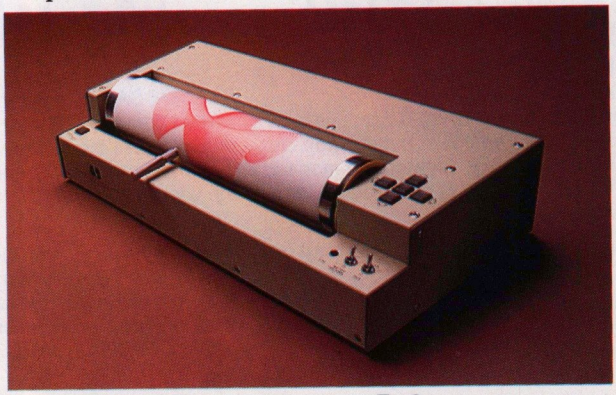
Now, with the Strobe 100 Graphics Plotter and Software package, you can create superb hardcopy graphics directly from your computer. And you can do it for a fraction of the cost of most other systems.

The Strobe System transforms complex data into dynamic, colorful visuals with a few simple commands from your computer. Charts and transparencies that once took hours to produce are plotted within minutes. Information can be presented as bar charts, pie charts, curves or isometrics in a variety of colors. And with a resolution of 500 points per inch, the Strobe 100 matches or surpasses the quality of plotters costing thousands of dollars more.

You can also save and modify your graphics through Strobe's menu-driven programs. A broad selection of software—including a VisiCalc*-compatible program—is now available.

When the Strobe Graphics System is interfaced to your computer, an 8-1/2 x 11 inch sheet of paper can speak anyone's language—visually. Visit your local dealer and learn how to start charting your fortunes today. Because a perspective on the present can also be your window on the future.



STROBE INCORPORATED

Strobe Inc.
897-5A Independence Avenue
Mountain View, CA 94043
Telephone 415/969-5130

The Strobe Graphics System

Seeing is believing

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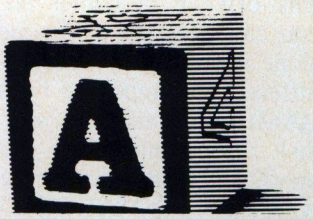
A IS FOR APPLE:

Executive Text Files



Ralph H Swerdlow/Call —A.P.P.L.E. Staff Writer

TO best understand and most effectively use EXECUTIVE TEXT FILES, the APPLE programmer must fix five facts firmly in mind. These are:

1. Text files consist of nothing more than a series of bytes, one following another, separated by returns, into fields. Each byte can represent either data (arithmetic and/or alphabetic) or instructions. Executive text files contain only instructions that are identical to commands in BASIC.
2. There are two types of BASIC commands; those that require a line number in a program (deferred) and those that do not (immediate execution). Some commands, such as "HOME" or "CALL-936," may be used in either the deferred or immediate modes.

...deferred commands require a line number; immediate do not.

3. All text files are created by writing a BASIC program using the commands of "OPEN, WRITE and CLOSE," with a NAME of the text file that is to be created. The BASIC program used to create an Executive Text file consists of a number of "PRINT" statements that become the commands desired when when that Text file is to be EXECed.
4. When the BASIC program is first run, a Text file is created on the disk, with the name that was selected in the BASIC program. If a catalog of the disk is now made, there will be such a name present, with a "T" preceding it, indicating that it is a Text file.
5. At the command of "EXEC" with the name of the file that was created, the Apple will "PRINT" all of the commands that were in the original BASIC program, as if they were being "typed at the keyboard by a live person"!! If these commands consist of a program, they now can be treated as any other normal program, and run, saved or listed!! If the commands consisted of immediate execution types, they will be carried out at once.

EXECing a file is like typing from the keyboard

With the ground work out of the way, let's start writing some EXEC Text files, and see how they perform. You will need to have a disk booted, as the Text files are saved to disk for later EXECing. We will call the Text files we are to create by the name of "PRACTICE". If you wish to save the files we create, use the name "PRACTICE.1, PRACTICE.2" and so on to later identify which is which. Here is how to create our first file:

```
10  TEXT:HOME
20  N$ = "PRACTICE"
30  D$ = CHR$(4)
40  O$ = "OPEN"
50  W$ = "WRITE"
60  C$ = "CLOSE"
```

Line 10 first sets the screen to its full width, and then clears it. The next five lines establish String statements that we will use to make our program writing easier by reducing the need to type each expression. Line 20 creates a string, N$, that contains the "NAME" that we will give to the Text file. Any time you wish to create a Text file with a different name, it is very simple to change only the contents of the string N$.

```
70   PRINT D$O$N$
80   PRINT D$;"DELETE";N$
90   PRINT D$O$N$
100  PRINT D$W$N$
1000 PRINT D$C$N$
```

These lines first Open the Text file that has the name in the String "N$," then Delete the same file, so that had there been a Text file of the same name on your disk, it will be erased. Note that we may write our Strings one after another and that semi-colons are not needed; this technique reduces both typing time, and the risk of typing errors.

...semi-colons are optional in PRINT statements...

Then they open the file again, and write to the file; line 1000 ends the program by closing the Text file that was created. We will leave sufficient space to add more lines, thus the last line is numbered 1000.

Save this to a disk, using the command "SAVE TO MAKE PRACTICE." This BASIC program will serve as the skeleton upon which you will hang the flesh to make Exec Text files in the future!! A catalog of the disk now shows a BASIC program called, "TO MAKE PRACTICE."

Now, add line 110:

```
110 PRINT "HOME"
```

EXECUTIVE TEXT FILES

List the program, and then run it by typing, "RUN." Note that the disk drive light comes on and that you can hear the drive motor. This alone should tell you that something different is happening because most BASIC programs do not start the disk drive when they are run. Do another catalog, and now there is both the "TO MAKE PRACTICE" and "PRACTICE" on the disk, with a "T" preceding the latter. List the program once more. It is still there!! Now type:

```
"EXEC PRACTICE"
```

If all went as expected, your screen cleared, as if *you* typed "HOME." Here is what happened. When the command "EXEC PRACTICE" was EXEC'ed, the Apple printed out the contents of the Text file, which at this point consisted only of the command "HOME", and the computer did what it was told to do, cleared the screen.

Now type "LIST," and there is your program once more, demonstrating that EXEC'ing a Text file does not erase a program in memory. Try it again, list several times, or fill the screen with garbage of some sort. Type, "EXEC PRACTICE," and the screen clears. This is a very important characteristic of Text files; they do not destroy programs nor does listing a BASIC program or in fact, the running of a BASIC program, impair the later EXEC'ing of a Text file!!!

...EXEC files do not destroy programs...

Now lets add more flesh to our original program, by adding line 120. Load the program "TO MAKE PRACTICE," and add line 120:

```
120  PRINT "NEW"
```

Now run this program. The disk drive again comes to life, and a new Text file, though with the same name of "PRACTICE" is created, but this new Text file contains an additional command, line 120.

List several times, and fill the screen with words. Type, "EXEC PRACTICE," and as expected, the screen clears. So far not much difference from the first program we EXEC'ed. However if you try listing the program, it is gone!! The command in line caused the trusty Apple to type, "NEW," and our computer did so!!

Now add line 130 and 140 to the program, "TO MAKE PRACTICE."

```
130  A$ = "ISN'T THIS FUN."
140  PRINT "PRINT A$"
```

Save this program, (by typing, "SAVE TO MAKE PRACTICE") and then run it, creating a new Text file, but one with the same name of "PRACTICE." Now when it is EXEC'ed, the Apple will print the contents of the String "A$".

You can demonstrate the same thing by just typing:

```
"A$ = "ISN'T THIS FUN."
"PRINT A$"
```

because these are immediate commands that will be executed by merely typing each, followed by a RETURN of course, at the keyboard. Your Apple just did the work for you when the file was EXEC'ed!!

Many lines in a BASIC program look like this:

```
PRINT "ISN'T THIS FUN"
```

The easiest way to print such lines is to make a String which contains the expression, as we did earlier. Here is another method of doing the same thing. Add lines:

```
150  Q$ = CHR$(34)
160  PRINT "PRINT";Q$;"AND
     EDUCATIONAL ALSO"
```

This concantenates (joins together) the statements inside the ["] with the String Q$; CHR$(34) is the quotation mark! After running the previous program, you can prove this by typing, "PRINT CHR$(34)," followed by a RETURN, and a ["] will appear. this is a fine way to put quotation marks into statements that you wish printed.

The commands "HOME," "NEW," "PRINT" and many others may be used in the immediate or deferred mode, thus they do not require a line number to function. When they are "typed" as the Text file is EXEC'ed, these commands are EXECuted at once by the computer. This might be a good time for the reader to review BASIC to remember which instructions are used only in the deferred mode, which only in the immediate, and which in both.

...commands are executed in the order they were entered...

The commands are EXECuted in the order that they were first entered into the BASIC program that was used to create the Text file, but if they have line numbers, our computers arrange the commands into proper sequence.

Now change the contents of the String A$ (in line 130) to anything else and rerun the program. The contents of your new String will be printed.

What would happen in you now change line 130 of the last program to:

```
130  ISN'T THIS FUN
```

and delete line 140?

Note the lack of quotation marks and omission of the world "PRINT." Go ahead and try it; first run the program and then EXEC it. You will get the message, "?SYNTAX ERROR." Do you know why? You can do the same thing from the keyboard of your Apple. Clear the screen, and type, ISN'T THIS FUN, (without quotations) and a return; the same error message is printed, because this statement is not recognized by the computer as a legitimate BASIC command!! So when the same statement is part of the data contained within a Text file, and then that file is EXECuted, it is exactly as if you typed the same sentence at the keyboard!! The lesson to be learned by this example is that the data statements in any Executive text file *must contain only legal commands that the Apple can execute.*

How then to enter deferred mode commands into the "MAKE PRACTICE" program? Here is how:

First load the program, then list it. You should have lines 10–100, and the line 1000. If not, then delete all other lines, and save MAKE PRACTICE so that you will have it on disk for later use.

Now add these lines:

```
110 PRINT "10 HOME"
120 PRINT "20 FOR I = 1 TO 20"
130 PRINT "30 PRINT I"
140 PRINT "40 NEXT I"
150 PRINT "50 END"
160 PRINT "DEL 1,9"
170 PRINT "DEL 51,2000"
```

Now run this program and a new Text file will be created, still with the name of, "PRACTICE." Can you see what will happen when you EXEC PRACTICE? Lines 110 to 150 will be printed to the computer. When you first EXEC the Text file, nothing will appear on the screen except for a series of Applesoft prompts, and nothing else. At this point, you may list the program, and there is the BASIC program typed in lines 110-150 in our last MAKE PRACTICE. Now the new BASIC program can be run and it will print the digits as expected. You may merely EXEC the Text File, then type, "RUN," and the Apple will do so. To see what the computer is doing, type the command, "MON C,I,O," and you will be able to see each line being "typed" by the computer as the Text file is EXECed....

First, line 110 is EXEC'ed printing, "10 HOME." Next lines 120 to 150 (which continue the printing of our new BASIC program) are typed to the screen. These lines of the Text file create the lines of the BASIC program with line numbers; next lines 160 and 170 delete all that created the Text file leaving only the BASIC program in memory. The command "DEL" can be used in both immediate or deferred modes, so lines 160 and 170 could have printed line numbers to the BASIC program. The entire process may be watched if the command "MON I,C,O" had been in effect. The command, "NOMON C,I,O" makes the the EXECing of a Text file invisible, except for the Applesoft prompts. This new program may be saved (for example, type: "SAVE PRACTICE.A") and then listed or run whatever desired. It is very important to use a different name for the BASIC program that was created, if it is to be saved to the disk, else there will be a Text file and a BASIC file with the same names; a very confusing situation for both you and your Apple!!

"NOMONCIO" will hide the EXECing of a text file...

For all practical purposes, Text files may be of any length desired, limited only to available memory. The skeleton of MAKE PRACTICE has sufficient space between lines 101 and 999 to make almost any Text file that you may need, limited only by your imagination and requirements. Remember that by changing the contents of the String N$ in line 60, and the data in lines 101–999, you can create as many EXEC Text files as you want.

Why use Text files at all? They are very useful for many programming purposes. For example, working on a long BASIC program that may require frequent changes. The program may be retained as a Text file, and then EXECed as needed. The changed program then can be saved (again with another name) to the disk. This process can be repeated as often as necessary, without the need to retype the program each time. If you have many favorite subroutines, they can be made into Text files and EXECed into any programs under development. Some programmers keep a disk which contains only Text file subroutines that are of importance to them.

EXEC'ing a Text file does not destroy a program in memory as loading or running a program does, so your program is not lost, but is still present for you to use. The commands in the Text file will be added to the program in memory, and become part of your new program; this is very useful in program development!

If there is a potential conflict due to identical line numbers, the RENUMBER utility may be employed to change the line numbers to avoid this problem; PROGRAM LINE EDITOR will also do the job.

The program called "CAPTURE" is a BASIC program that creates a Text file when it is run!! You can find it on page 76 in the Apple DOS Manual. CAPTURE is added either at the beginning or the end of a BASIC program in memory. The Text file that it creates will have the name, "LISTING" which will be found in the catalog after the program is run. The data statements of this Text file will consist of the lines in the BASIC program that was in memory when CAPTURE was run! You can then use the RENAME command to change LISTING'S name to something more appropriate to what the Text file does; remember to use a different name than that of the original BASIC program. I prefer to add the prefix "TEXT." to the Text file name; this tells me what it is and that it is and that it is a Text file based BASIC program still saved on my disk. I also have renumbered "CAPTURE" to start at line 30000, because most of my programs are much shorter, and thus there are no line number conflicts when CAPTURE is appended to the end of of my program in memory. I have also changed old line 6 of the Apple Manual to read "LIST 1,29999." I have created a Text file called, "MAKE CAPTURE" which is kept on a utility disk. It is very easy then to EXEC "MAKE CAPTURE", which creates a BASIC program and append it to any BASIC program that I am working on. Here is how to do the same.

...add the prefix "TEXT." to a text file.

```
30000 REM TO MAKE CAPTURE
30001 D$ = CHR$(4)
30002 PRINT D$;"OPEN
      LISTING"
30003 PRINT D$;"WRITE
      LISTING"
30004 POKE 33,33
30005 LIST 1,29999
30006 PRINT D$;"CLOSE
      LISTING"
30007 TEXT:END
31001 PRINT D$;"OPEN MAKE
      CAPTURE"
31002 PRINT D$;"WRITE MAKE
      CAPTURE"
31003 POKE 33,33
31004 LIST 30000,30008
31005 PRINT D$;"CLOSE MAKE
      CAPTURE"
31006 TEXT:END
```

EXECUTIVE TEXT FILES

When this program is RUN it will create a Text file called, "MAKE CAPTURE." Lets study this program.

Lines 30001 to 30007 are the lines that constitute the Text file "CAPTURE." Note that each data statement consists of an immediate type of command, and thus does not require a line number. When these lines are EXECed, they create a Text program, "LISTING" that captures a BASIC program in memory.

Lines 31001–31007 capture the earlier lines in a Text file called, MAKE CAPTURE. Thus, we have written a BASIC program that creates a Text file that captures a Text file that creates a BASIC program that captures a BASIC program into a Text file!!!

Save this program, with the name of "TO MAKE CAPTURE." When it is run, it will create a Text file with the name of "MAKE CAPTURE." Now, whenever this Text file is EXECed, the BASIC program called, "CAPTURE" will be appended to any BASIC program in memory, starting at line 30000. When you run this BASIC program, a Text file containing the commands of your BASIC program will be created. As an interesting experiment, once "CAPTURE" has been appended, typing: "RUN 30000" will accomplish the same task. The Text file, "MAKE CAPTURE" can be transferred to each of your working disks, (using F.I.D, for example) and whenever you need the BASIC program of "CAPTURE," all you need to do is EXEC MAKE CAPTURE, and there it is; CAPTURE will be appended to any BASIC program in the Apple's memory at the time!!

Not everyone has a MODEM, but those that do, are able to send Text files by phone to others who also have one. BASIC programs can not easily be sent by phone, but with CAPTURE, an Apple user is able to convert any BASIC program to a Text file, and later transmit the created Text file over the phone. The receiver can then save the Text file, EXEC the file, and have the BASIC program.

In summary:

1. EXECutive Text files are Text files that contain in their data lines legal BASIC commands that may be either deferred or immediate types.
2. Commands that are of the deferred type must have a line number.
3. The command "EXEC" is similar to the command "RUN,"* and when issued causes the contents of the data statements of the Text file to be printed without erasing the program in memory. The BASIC program may then be run, listed or saved as can any BASIC program.
4. Text files are created using the DOS commands of "OPEN, WRITE, AND CLOSE," with Control "D" or CHR$(4) preceding each command. A specific name must be incorporated into each command. The Text file created will have the name that was chosen.
5. If a data statement in a Text file is not a legal BASIC command, an error message will be printed by the computer, saying "?SYNTAX ERROR" whenever the Text file is EXEC'ed.

Text files are not difficult to master, and they do offer many benefits to the Apple user. Text files containing legal BASIC commands add great power to our computers. Go ahead and try them; you not only will have fun, but you are sure to learn something helpful to your computing.

** In fact one could say that RUN will run a deffered mode program and EXEC will run an immediate mode program. ...ed.*

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A CALL —A.P.P.L.E. TUTORIAL:

Examining Directory Sectors

David Huffman

THE DOS Reference Manual (DOS 3.2 or 3.3) explains the arrangement of the information in a typical sector of the diskette directory on pages 129-131. However, we can usually only examine this information directly by loading each sector into memory and examining it with a hex-ASCII dump which is formatted very differently from the examples in the DOS Manual. Finding your way around in the hex-ASCII dump by consulting the DOS Manual can be quite a chore as I found out several months ago while trying to restore a master diskette that was somehow damaged by an accidental reset during a copy operation (even though the jacket was not notched!). The damage caused the CATALOG command to list the first file name correctly and then list garbage for the second file name and quit. I first tried RECONSTRUCT VTOC, but the disk drive made strange groaning noises I had never before heard, so I quickly abandoned that method with a reset. The next step was to examine the VTOC from a hex-ASCII dump and it seemed to be OK. However, an examination of the diskette directory revealed a collection of garbage following the entry for the first file. I had to rebuild the first sector byte-by-byte using the DOS Manual as a guide and kept thinking, "There must be an easier way". The accompanying table is an outgrowth of that desire to find an easier way.

There are several good utilities around, including DAN'S DISK UTILITIES, DISK FIXER and DISK ZAP, which will allow you to read in a specified sector of the directory, examine it with a hex-ASCII dump, selectively change the sector data and then write the modified sector back out of the disk. The format of all the hex-ASCII dumps I have seen involves 32 lines, each line beginning with the address (in hex) of the first byte in the line, followed by the hex codes of eight bytes of the sector, followed by the ASCII representation of the eight bytes. When you examine a directory sector using such a program, the only part of the sector which will make much sense at first is the ASCII representation of the file names, but the other nonprinting bytes contain very important information. The table at the end of this article was designed to facilitate interpreting a typical directory sector from a hex-ASCII dump, and it has since proven so useful in my work that I thought I would make it available to the Call —A.P.P.L.E. membership. I keep my copy on the first page of my collection of "DOS Notes".

The directory of a normal 3.3 diskette begins with track $11 (17) sector $0F (15) and continues *backwards* to sector $0E (14), $0D(13),. . . to sector $01(1). The first 11 bytes of each sector of the directory do not pertain to any particular file. Byte $00 is not used. (All unused bytes are coded "XX" in the accompanying table.) Bytes $01 and $02 ("LT" and "LS") give the track and sector, respectively, of the block where the directory is continued from the current sector. If you dump track $11, sector $0F, these bytes should be $11, $0E. If bytes $01 and $02 are both $00, the CATALOG command will list only the files included up through the current sector, and files with entries in other sectors of the directory will be unavailable to DOS. Bytes $03 through $0A are apparently padded with zeros so that the last byte of the current sector will turn out to be the "end mark" code for the last (seventh) file in the sector.

The black lines across the table mark the beginning and ending of a file's entry in the directory . The first two directory entries for each file are symbolized in the table by "TT" and "TS". They give the track and sector location of the beginning of the track-sector list for the file. The track/sector list is just a list of the tracks and sectors where the contents of the file are stored. A large file may be spread out across numerous noncontiguous sectors if it is SAVEd onto a diskette containing many other small files and having a history of numerous file DELETEions. In such cases, the drive will make numerous sliding noises as it bounces back and forth between these widely separated tracks during a LOAD. If the same file were SAVEd onto a diskette that has not had a history of DELETEions, the track/sector list will consist mostly of numerically contiguous sectors and access time may be considerably improved. An entire disk may be cleaned up this way copying it with program FID from your DOS 3.3 master disk, rather than using the other copy programs available, which usually copy the disk as is, sector by sector rather than file by file. If "DeMuffined", FID is usable in a 3.2 DOS environment.

"FT" is the file type (and lock code). If the first hex digit is $0, the file is unlocked; if it is $8, the file is locked; if it is $1, it is an "R" or relocatable binary file such as can be produced by the DOS Tool Kit. The second digit is file type with 0=text, 1=Integer, 2=Applesoft, 4=binary, 8=the mysterious "S" file (Does anyone know anything about "S" files??), and 16 ($10) the "relocatable" binary file used by the DOS Tool Kit. If you are tempted to try converting a file from Integer to Applesoft by changing "FT" from $?1 to $?2, recall that while listings of Integer and Applesoft programs may look very similar, the programs are very different in terms of their organization in memory. If you change the "FT" of an Integer program from $?1 to $?2,

EXAMINING DIRECTORY SECTORS

the CATALOG command will list the file as Applesoft, and LOADing the program will automatically switch on the Applesoft interpreter if you have both BASICs in ROM, but the program will arranged improperly in memory and will be *totally* useless. Try it! It is, however, possible to change any file's type code to $00 and it can then be read as a text file, but reading will stop at the first occurrence of a null byte ($00) anywhere in the file. This eliminates a FP file.

"fn" stands for the hex code of one letter of the file name. Names shorter than 30 characters are appended with trailing blanks (hex code $A0). You can enter inverse, flashing, or control characters into a file name using the hex codes from page 15 of the new Apple][Manual.

"SC" stands for the number of sectors the file takes up, but this number is apparently not used by DOS for anything but the CATALOG command. The track/sector list will still be read by DOS all the way to the end when you LOAD a file, regardless of the value of "SC".

"EM" is normally $00 and serves as an end mark for the file's entry in the directory. The DOS 3.2 Reference Manual explains on page 130 that the DELETE command does not actually delete the file from the diskette, but merely marks the file's entry by changing the "TT" value to $FF. The file name and the data are still there unless you subsequently SAVE another file, in which case the old file name is replaced by the new file name, and at least part of the old file data may be overwritten. At the bottom of page 130, the DOS 3.2 Manual explains that when a file is DELETEd, the value of "TT" is transferred to "EM" for safe keeping. *This is wrong!* Check for yourself. DELETE a file and then note that its "EM" value is still $00. What actually happens is that the value of "TT" is transferred to the position of the last character of the file name (the last "fn"). Then if you run a file-restoring program like IAC's DISK HELPER, the value stored in the last "fn" is transferred back to "TT" and the file is suddenly restored! In the process, the last character of the file name gets converted to a blank (hex code $A0) regardless of what it was previously. I have circled the last "fn" position of each entry in the table to serve as a reminder of its unique role. This error in the DOS 3.2 Manual was corrected in the DOS 3.3 Manual with no comments about the change.

I hope you find the directory guide useful. Make a copy of one of your diskettes with many different kinds of files on it and begin experimenting around using one of the sector access programs available. You would be amazed at what you can learn about DOS by just messing around with the directory sectors!

SYMBOLIC GUIDE TO HEX DUMP OF ONE SECTOR OF DISKETTE DIRECTORY

	$0	$1	$2	$3	$4	$5	$6	$7
$00	XX	LT	LS	XX	XX	XX	XX	XX
$08	XX	XX	XX	TT	TS	FT	fn	fn
$10	fn	fn	fn	fn	fn	fn	fn	fn
$18	fn	fn	fn	fn	fn	fn	fn	fn
$20	fn	fn	fn	fn	fn	fn	fn	fn
$28	fn	fn	fn	(fn)	SC	EM	TT	TS
$30	FT	fn	fn	fn	fn	fn	fn	fn
$38	fn	fn	fn	fn	fn	fn	fn	fn
$40	fn	fn	fn	fn	fn	fn	fn	fn
$48	fn	fn	fn	fn	fn	fn	(fn)	SC
$50	EM	TT	TS	FT	fn	fn	fn	fn
$58	fn	fn	fn	fn	fn	fn	fn	fn
$60	fn	fn	fn	fn	fn	fn	fn	fn
$68	fn	fn	fn	fn	fn	fn	fn	fn
$70	fn	(fn)	SC	EM	TT	TS	TF	fn
$78	fn	fn	fn	fn	fn	fn	fn	fn
	$8	$9	$A	$B	$C	$D	$E	$F

	$0	$1	$2	$3	$4	$5	$6	$7
$80	fn	fn	fn	fn	fn	fn	fn	fn
$88	fn	fn	fn	fn	fn	fn	fn	fn
$90	fn	fn	fn	fn	(fn)	SC	EM	TT
$98	TS	FT	fn	fn	fn	fn	fn	fn
$A0	fn	fn	fn	fn	fn	fn	fn	fn
$A8	fn	fn	fn	fn	fn	fn	fn	fn
$B0	fn	fn	fn	fn	fn	fn	fn	(fn)
$B8	SC	EM	TT	TS	FT	fn	fn	fn
$C0	fn	fn	fn	fn	fn	fn	fn	fn
$C8	fn	fn	fn	fn	fn	fn	fn	fn
$D0	fn	fn	fn	fn	fn	fn	fn	fn
$D8	fn	fn	(fn)	SC	EM	TT	TS	FT
$E0	fn	fn	fn	fn	fn	fn	fn	fn
$E8	fn	fn	fn	fn	fn	fn	fn	fn
$F0	fn	fn	fn	fn	fn	fn	fn	fn
$F8	fn	fn	fn	fn	fn	(fn)	SC	EM
	$8	$9	$A	$B	$C	$D	$E	$F

"EM" = End Mark: Last byte of directory entry for that file. Always equal to $00.

"FT" = File Type: First digit is $0 if unlocked, $8 if locked, $1 if a Relocatable file. Second digit is file type with $0=text, $1=Integer, $2=Applesoft, $4=binary, $8=special, and $10=relocatable.

"fn" = File Name: These bytes are the hex codes of the characters in the file name. If the file is DELETEd, the last fn byte (circled) is used to store the old value of "TT".

"LT" = Link Track: Track where directory is continued. This is usually $11 (or $00 indicating no more links).

"LS" = Link Sector: Sector of track "LT" where directory is continued.

"SC" = Sector Count: The number of sectors occupied by the file.

"TT" = Track/sector list Track: Track where track/sector list of this file starts. Converted to $FF by DELETE.

"TS" = Track/sector list Sector: Sector of "TT" where track/sector list of the file starts.

" " = Boundaries between the entries for successive files in the directory.

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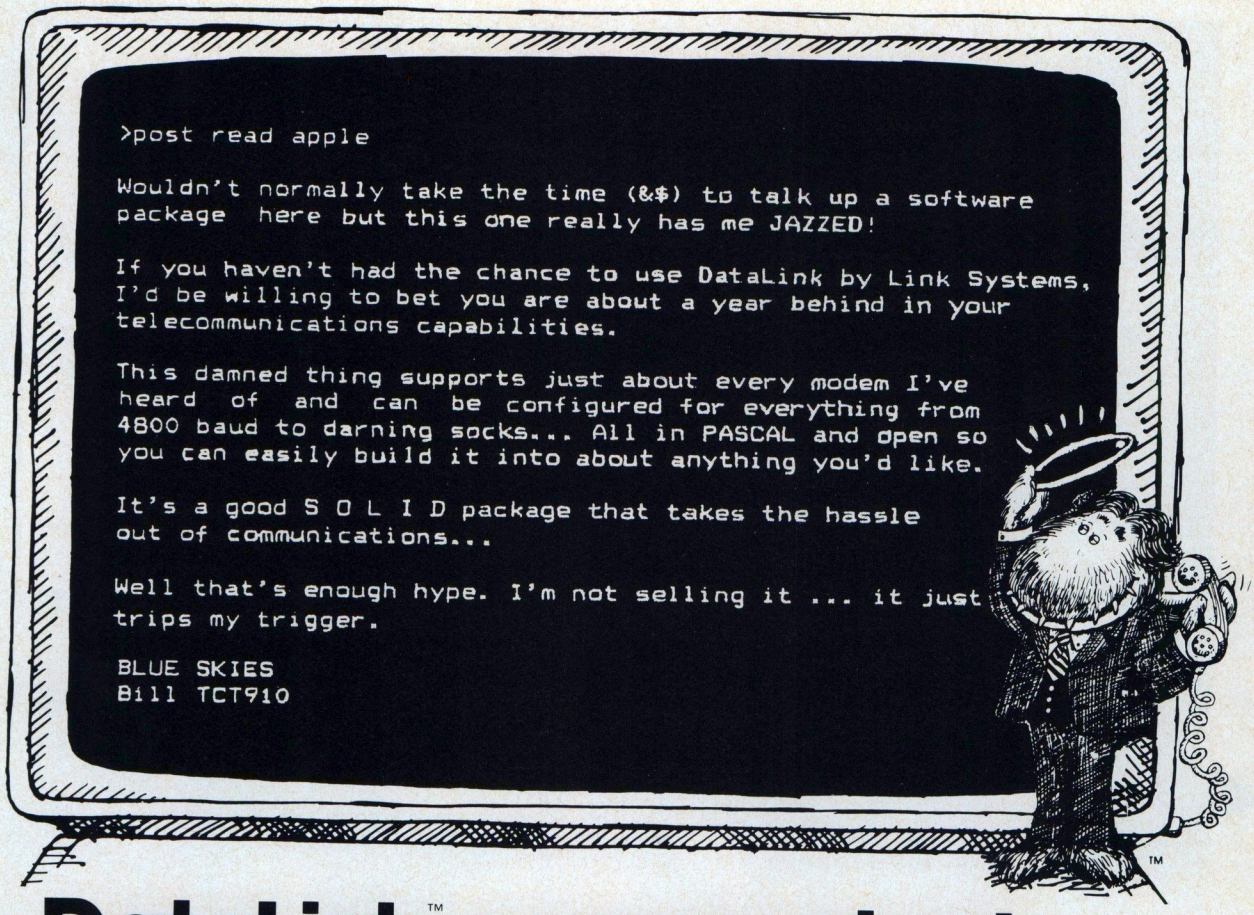

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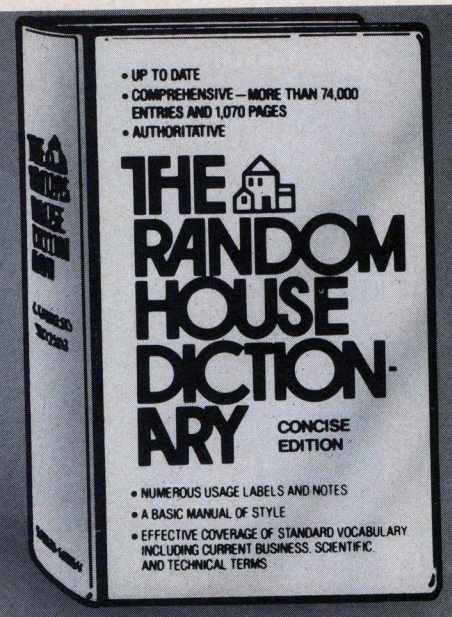

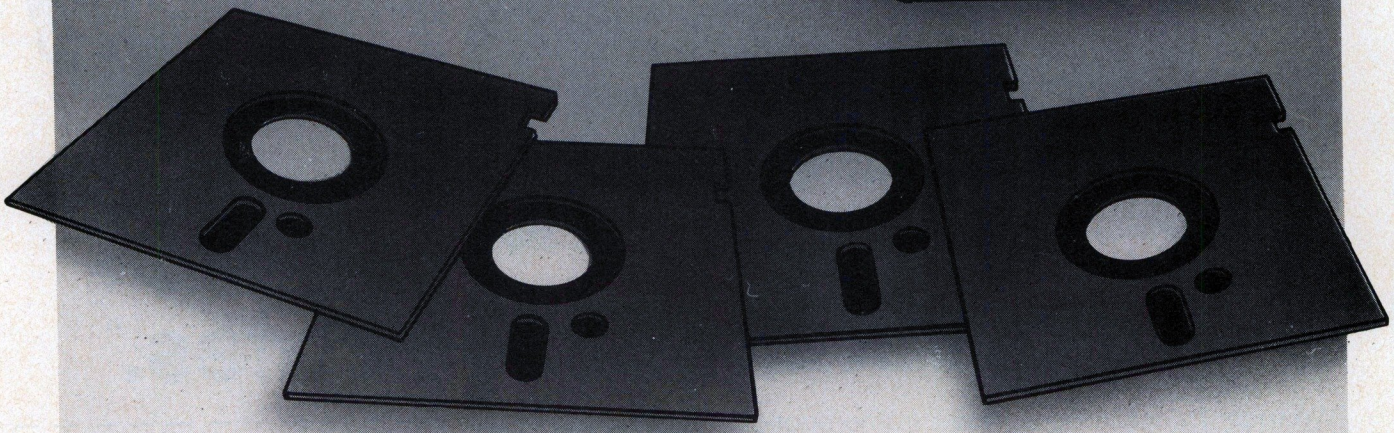

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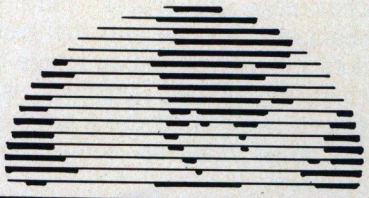

Part Two

IN the last article we talked about the way in which the Apple uses its internal address bus to control input and output operations. Methods of controlling the address bus from BASIC and Assembly Language were shown, and examples were given illustrating the Apple's "on-board I/O" (keyboard, speaker, game paddles and so on). The I/O addresses not covered last time all cause signals to be sent to the peripheral card slots.

To understand about peripheral cards, we should digress first into software, and leave the hardware waiting. The Apple comes with standard programs in permanent memory (ROM) for doing input from the keyboard and output to the TV screen or video monitor. These built-in programs are part of a larger program called the Apple System Monitor, or just Monitor for short.

Let's first consider the problems of putting a character on the video display. The video circuitry gets its information from the Apple's temporary (RAM) memory. When the Apple is displaying the primary page of text (which is nearly all the time), all the information on the screen is kept in memory locations $400 to $800. To output a character to the screen, all you need to do is put the numeric code (see page 15 of the Apple Reference Manual) for that character in the proper memory location in the $400-$800 range. This would be a very simple thing to do if the positions on the screen corresponded to the locations in memory in a nice, sequential manner. You might expect, for example, that the upper left corner of the screen would be an image of memory location $400, the next character position would be $401, and so on. Since there are 40 columns of text on the Apple screen, you would expect that the first position of the second line would be $400 + $28 (= 40 decimal), or $428. Alas, it is not so. All the positions in a single line of text correspond to memory locations in sequence, but the sequence is broken when you move from one line to the next.

The primary page of text is stored in locations $400 - $800.

Screen memory is not entirely sequential.

The TEXT MEMORY DEMO program (listing number 1) illustrates this. When it runs, it shows you the memory address which corresponds to each position on the text screen. Some of the memory locations in the range $400 to $800 do not show up on the screen at all! Notice that $400 (hex) is the same as 1024 (decimal).

The GRAPHICS MEMORY DEMO program (listing number 2) shows the same information, but for the Hi-Res graphics screen instead. Notice that each memory location for the graphics screen shows up as just a narrow line on the video display.

Listing 1

```
]LIST
10  REM
TEXT MEMORY DEMO BY TOM LITTLE

 CALL -A.P.P.L.E. : JULY 1982

50  TEXT : HOME : VTAB 24
100 IS = 32: REM   INVERSE SPACE
110 NS = 160: REM  NORMAL SPACE
120 T1 = 1024: REM  BEGINNING OF
     TEXT MEMORY
130 T2 = 2048: REM   END OF TEXT
     MEMORY
140  REM
150  FOR LOC = T1 TO T2
160  POKE LOC,IS
170  HTAB 1: PRINT "LOCATION #";L
     OC;
180  FOR PAUSE = 1 TO 100: NEXT P
     AUSE
190  POKE LOC,NS
200  NEXT LOC
210  END
```

Listing 2

```
]LIST
10  REM
HI-RES MEMORY DEMO BY TOM LITTLE

  CALL -A.P.P.L.E. : JULY 1982

50  HGR : HOME : VTAB 24
100 WHITE = 255: REM  ALL PIXELS
     LIT
110 BLACK = 0: REM  NO PIXELS LIT

120 G1 = 8192: REM  BEGINNING OF
     HI-RES GRAPHICS MEMORY
130 G2 = 16384: REM  END OF HI-RE
     S GRAPHICS MEMORY
140  REM
150  FOR LOC = G1 TO G2
160  POKE LOC,WHITE
170  HTAB 1: PRINT "LOCATION #";L
     OC;
180  FOR PAUSE = 1 TO 10: NEXT PA
     USE
190  POKE LOC,BLACK
200  NEXT LOC
210  END
```

This is because when text is displayed, all we need to store in memory is a code for the character. A character generator chip then changes this code into the group of dots which make up an image of the character. When graphics is displayed, we cannot use a code; every dot must take up some room in memory.

So it is not an easy task to print a string of characters in successive screen locations, which is what we must do if we want to display a message on the screen.

Don't lose any sleep over it though, because there is a Monitor routine called COUT1 which does just that. An Assembly Language programmer can load the accumulator register with the code of the character he wants to print out on the screen and then call COUT1 (JSR $FDF0). COUT1 keeps track of the

COUT1 keeps track of the next available screen location.

next available screen location for a character to be printed, and stores the code in the proper memory location for that screen location. It also understands that a carriage return character means that the output cursor (the next available screen location) should be moved to the first column of the next line, and that a bell character should beep the Apple's speaker. It also "scrolls" the screen upward if there is no more room. In short, COUT1 does everything a good screen output program should. Almost every time the Apple prints text on the screen, it uses COUT1.

The folks who designed the Apple were smart. They realized that if all output was done through COUT1, it would be very difficult to get output to go to a printer, a modem, or whatever. Also, they reasoned, if the user did not like the way COUT1 handles output, he should be able to write his own character output routine. So they invented CSW.

CSW is a location in the Apple's temporary memory ($36). This memory location contains the address of the routine which should be used for output. Ordinarily, it contains $FDF0 (the address of COUT1). Notice, by the way, that addresses are two bytes long, so CSW really includes the two locations $36 and $37. The Apple stores numbers with the last (least significant) byte in the lower memory location, so if CSW contained the address of COUT1, $36 would contain $F0, and $37 would contain $FD.

The Apple makes use of CSW by means of the subroutine COUT, located at $FDED in the Apple System Monitor. When an Assembly Language program does a JSR COUT, it jumps to $FDED, where there is an instruction that does an indirect jump through CSW. This means that the program will then continue executing at whatever address is stored in CSW, usually $FDF0. Admittedly, this is a roundabout way to get to COUT1 ($FDF0), but it allows us to intercept the out-

You could write a short program to do customized output . . .

put process. You could write a short program to do customized output, and put its address in CSW. After you did this, all calls to COUT would end up running your program instead of COUT1. Since nearly all Apple software uses COUT for output, most output would then be done through your own program.

Keyboard input works the same way. There is a monitor subroutine, KEYIN, at $FD1B, that reads the keyboard. It is a rather simple routine. It doesn't display a flashing cursor or do anything fancy. Most input is done through a different routine, RDKEY, at $FD0C. This routine displays a flashing cursor, then jumps through KSW. KSW is for input what CSW is for output. It is a location in memory ($38 and $39) which contains the address of an input routine, normally KEYIN. Because most Apple programs get their input by calling RDKEY, changing KSW changes the Apple's method of getting input.

If you're still paying attention and haven't been off daydreaming, you will realize that all of this talk about redirecting input and output sounds a lot like the IN# and PR# commands in BASIC. Well, it's true. IN# changes KSW and PR# changes CSW, so that I/O is done through the peripheral card of your choice.

Ah! Peripheral cards! It is now time to talk about the rest of Apple's special I/O addresses, which refer to peripheral cards. After all, KSW and CSW are supposed to contain the address of a program. How can a peripheral card be a program? What do PR# and IN# really do?

Nearly all of the Apple's 4096 separate I/O addresses refer to peripheral card slots. Surprisingly, though, each slot only gets three unique signals from the Apple. The names of these three signals are DEVICE SELECT, I/O SELECT, and I/O STROBE. The I/O STROBE signal goes to all the peripheral card slots, but each slot has its own special DEVICE SELECT and I/O SELECT. To be perfectly accurate, it should be noted that slot 0 doesn't get an I/O SELECT signal.

The Apple's built-in I/O addresses each do specific tasks, like reading the keyboard. What, then, do the peripheral card I/O signals do? The answer is that it depends on the peripheral card. A card can be built to use its three signals however it likes.

You have no idea what referencing a peripheral address will do . . .

You have no idea what referencing a peripheral I/O address will do unless you have documentation for that particular peripheral card which tells you the answer.

This is a good time to look at Table 1 to see which addresses produce which signals.

The DEVICE SELECT signal for each card is produced by referencing one of the sixteen addresses indicated in the table. Most peripheral cards use these addresses to get commands from the Apple. If you have a Language Card (in slot 0 I hope!), you will recognize the addresses $C080 to $C08F as corresponding to the commands you can give to the Language Card about whether it should be enabled for reading and writing and so on. All the peripheral card slots have access to the Apple's entire address bus, so when a card gets the DEVICE SELECT, it can check the address bus to find out which particular address was used to produce the DEVICE SELECT signal, and act ac-

Table 1

Apple II I/0 Addresses

ADDRESESS (HEX)	(DECIMAL)	NAME	FUNCTION
C000 to C00F	49152 to 49167	Keyboard Data	allows the keyboard to place its data on bits 0–6 of the data bus; bit 7 is on if a key has been pressed
C010 to C01F	49168 to 49183	Keyboard Strobe	tells keyboard to wait for the next keypress; should be done after each time a character is obtained
C020 to C02F	49184 to 49199	Cassette Output	toggles the cassette output (produces a "click" on a cassette recording)
C030 to C03F	49200 to 49215	Speaker Output	toggles the speaker output (produces a "click" on the Apple's speaker)
C040 to C04F	49216 to 49231	Utility Strobe	sends a pulse to the Utility Strobe connection on the game I/O port
C050	49232	Graphics mode	tells the Apple's video circuitry to display graphics on the screen, as opposed to text
C051	49233	Text mode	tells the Apple's video circuitry to display text on the screen
C052	49234	Nomix	tells the Apple's video circuitry to display graphics only (no split screen); graphics mode must be on
C053	49235	Mix	tells the Apple's video circuitry to display graphics and text together (split screen); graphics mode must be on
C054	49236	Page 1	tells the Apple's video circuitry to display the primary page (either graphics or text)
C055	49237	Page 2	tells the Apple's video circuitry to display the secondary page (either graphics or text)
C056	49238	Low Resolution	tells the Apple's video circuitry to display lo-res graphics (stored in the text pages); graphics mode must be on
C057	49239	High Resolution	tells the Apple's video circuitry to display hi-res graphics; graphics mode must be on
C058	49240	an0 off	turns off the "annunciator 0" output on the game connector
C059	49241	an0 on	turns on the "annunciator 0" output on the game connector
C05A and C05B	49242 and 49243	Annunciator 1	likewise
C05C and C05D	49244 and 49245	Annunciator 2	likewise
C05E and C05F	49346 and49247	Annuciator 3	likewise
C060	49248	Cassette Input	puts the current state of the cassette input on bit 7 of the data bus
C061	49249	Pushbuttom 0	puts the current state of the pushbutton on paddle 0 onto bit 7 of the data bus. (Don't ask why the Apple Reference Manual calls it pb1)

C062	49250	Pushbutton 1	likewise
C063	49251	Pushbutton 2	likewise
C064	49252	GC 0	puts the current state of the game controller 0 input on bit 7 of the data bus. Refer to the text on how to use this to read the game paddle dial.
C065	49253	GC 1	ditto
C066	49254	GC 2	likewise
C067	49255	GC 3	likewise
C068 to C06F	49256 to 49263		repeat of C060 to C067
C070 to C07F	49264 to 49279	GC Strobe	Resets the timing circuits for use with the Game Controller inputs.
C080 to C08F	49280 to 49295	DEVICE SELECT 0	sends the DEVICE SELECT signal to slot 0. The peripheral card in that slot can interpret these addresses however it chooses.
C090 to C09F	49296 to 49311	DEVICE SELECT 1	likewise
C0A0 to C0AF	49312 to 49327	DEVICE SELECT 2	likewise
C0B0 to C0BF	49328 to 49343	DEVICE SELECT 3	likewise
C0C0 to C0CF	49344 to 49359	DEVICE SELECT 4	likewise
C0D0 to C0DF	49360 to 49375	DEVICE SELECT 5	likewise
C0E0 to C0EF	49376 to 49391	DEVICE SELECT 6	likewise
C0F0 to C0FF	49392 to 49407	DEVICE SELECT 7	likewise
C100 to C1FF	49408 to 49663	I/O SELECT 1	sends the I/O select signal to slot 1. Ordinarily these addresses will refer to a permanent memory chip on the peripheral card, which is activated by the I/O select signal.
C200 to C2FF	49664 to 49919	I/O SELECT 2	likewise
C300 to C3FF	49929 to 50175	I/O SELECT 3	likewise
C400 to C4FF	50176 to 50431	I/O SELECT 4	likewise
C500 to C5FF	50432 to 50687	I/O SELECT 5	likewise
C600 to C6FF	50688 to 50943	I/O SELECT 6	you guessed it
C700 to C7FF	50944 to 51199	I/O SELECT 7	uh huh
C800 to CFFF	51200 to 53247	I/O STROBE	sends the I/O strobe signal to all slots. Several cards can have a permanent memory chip accessed by these addresses, but they must cooperate, since each slot does not get its own unique signal.

cordingly. So any peripheral card could do up to 16 different actions when it gets a DEVICE SELECT signal, depending on which particular number is on the address bus at the time.

This means that peripheral cards generally have to have decoding circuits ("gnomes") of their own in order to receive any reasonable number of commands from the Apple. For example, a printer interface in slot 1 might use its DEVICE SELECT addresses ($C090 to $C09F) to do things like put the printer on line, control echoing of characters on the video screen, blow up your computer, or whatever. It's all up to the interface card. Depending on how the peripheral card is designed, it might totally ignore the DEVICE SELECT signal, although this is not likely.

The next signal that goes to the peripheral cards is the I/O SELECT signal. By the way, if you're trying to figure out the significance of these names, don't bother. They had to call them something, but it's hard to name something when you don't know what it'll be used for! Each slot's I/O SELECT signal is produced by referencing any one of 256 different addresses. That's a lot of addresses. Most peripheral cards do not use the I/O SELECT signal to get commands from the Apple (which is a common use of DEVICE SELECT). Instead, many peripheral cards have a small permanent memory chip (a PROM) which is activated by the I/O SELECT signal. In this way, each of the special I/O SELECT addresses corresponds to an actual memory location on the peripheral card.

The idea behind this is that each peripheral card can have a short program which is permanently on the card, so you may not need to load in special software to use a peripheral card.

Now you can see how PR# and IN# work. When you type PR#1, BASIC puts the address $C100 in CSW ($C100 is the first address in the range which produces the I/O SELECT 1 signal). Now the next time the Apple tries to output a character by calling COUT, the program will jump to $C100. This jump puts $C100 on the address bus and activates I/O SELECT 1. We now pray that there is a peripheral card in slot 1 which can do something reasonable when it gets this signal. A printer card would almost surely have a permanent memory chip on it, so that jumping to $C100 would run the program on the memory chip, and hopefully turn the printer on and output the character.

. . . jumping to $C100 would run the program on the chip . . .

So although the BASIC manual will tell you that PR#n will send all subsequent output to a peripheral card in slot n, it would be more accurate to say that PR#n will send an I/O SELECT signal to slot n the next time output is requested. There is a difference. The disk controller card, for example, does not print a character on the disk when you say PR#6. It does, however, run the program on its own permanent memory chip (activated by I/O SELECT 6). This program boots the disk.

The point of all this is that although many peripheral cards in fact do perform I/O when you type PR#n or IN#n, they don't have to. Again, it is up to the designer of the card.

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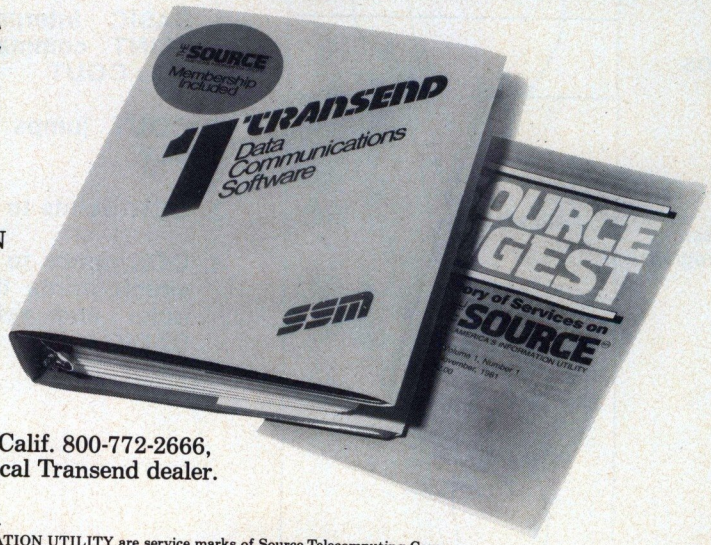

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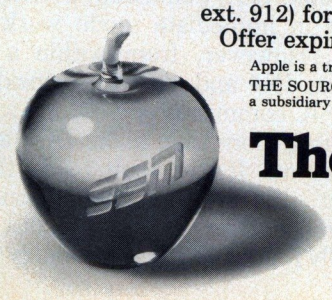

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INS AND OUTS

Because each slot has its own I/O SELECT signal, several cards can be active at once. Of course there can only be one address in CSW or KSW at a time, but an Assembly Language program (or even BASIC) could call programs on different cards. More on this later.

The final signal, I/O STROBE, is sent to ALL slots whenever a number between $C800 and $CFFF is on the Apple's address bus. That means that there are 2048 addresses (that's half of the Apples total I/O addresses) that activate the I/O STROBE. The fact that this signal is sent to all the peripheral cards means that they have to come to some kind of agreement about what it means, or else disaster will ensue.

The intended use of I/O STROBE is to enable a large permanent memory chip on one peripheral card. This way, a peripheral card could have 2K memory for a program or data, which would always correspond to $C800–$CFFF, regardless of which slot the card happened to be in. But if several cards used this memory area, the Apple would be unable to determine which one to look at. To resolve the problem, the Apple designers made it clear that all peripheral cards should interpret the address $CFFF as a command to turn off their $C800 memory if they have one. One peripheral card can gain control of this address range by referencing address $CFFF to deactivate the $C800 memory on the other cards.

The mechanics of how this all works is of interest mainly to people who design peripheral cards. But the programmer must be aware that the addresses $C800 to $CFFF may be "shared" among several peripheral cards. The addresses will refer to whichever card thinks it has control. For example, the Apple SILENTYPE printer uses some of these addresses to store its parameters (margins, intensity, etc.). When you give the printer control (by "PR#1", for example), then it will make sure that addresses $C800 to $CFFF refer to memory locations on its own card. This is why you may set the SILENTYPE's parameters only after you initialize it with the PR# command.

If you're beginning to think the process of outputing a single character is astonishingly complicated, you're right. But, as they say, You ain't seen nuthin' yet. There is a powerful software life-form known as DOS (Disk Operating System, for the uninitiated), which has its claws into everything you try to do. DOS is not content to let you play around with peripheral I/O all by yourself.

DOS gets its commands either through input (when you type them from the keyboard) or through output (when your program says PRINT D$"CATALOG" or something similiar). For this reason, DOS feels that it must have control of CSW and KSW so that it can grab any DOS command as it goes through. To achieve this goal, DOS puts its own addresses in CSW and KSW, and it tries very hard to make sure you don't change them. DOS would rather look at everything first, then decide whether it should go on to the screen, printer, or wherever you had in mind. So DOS keeps its own CSW and KSW. Doing output when DOS is around consists of jumping through CSW (as usual). But CSW now points to a routine in DOS. The DOS routine looks at the character, and if it is not a DOS command, it effectively jumps through its own internal version of CSW which contains the address of the real output routine. In essence, DOS is censoring your mail.

You can see all the trials and tribulations associated with printing out a character in Figure 1.

However, PR# and IN# still work pretty much as advertized. This is because they are DOS commands, as well as BASIC commands. The DOS PR# command has the effect of changing DOS's *private* version of CSW, leaving the *real* CSW pointing into DOS. Anything you type from the keyboard is interpreted as a possible DOS command, so IN# and PR# in immediate mode work just fine. However, from within a program, IN# and PR# are considered BASIC commands and usually will do nothing more than make DOS angry with you. If you want to do things right, your program should issue the corresponding DOS command (e.g. PRINT D$ "PR#1"). Assembly Lan-

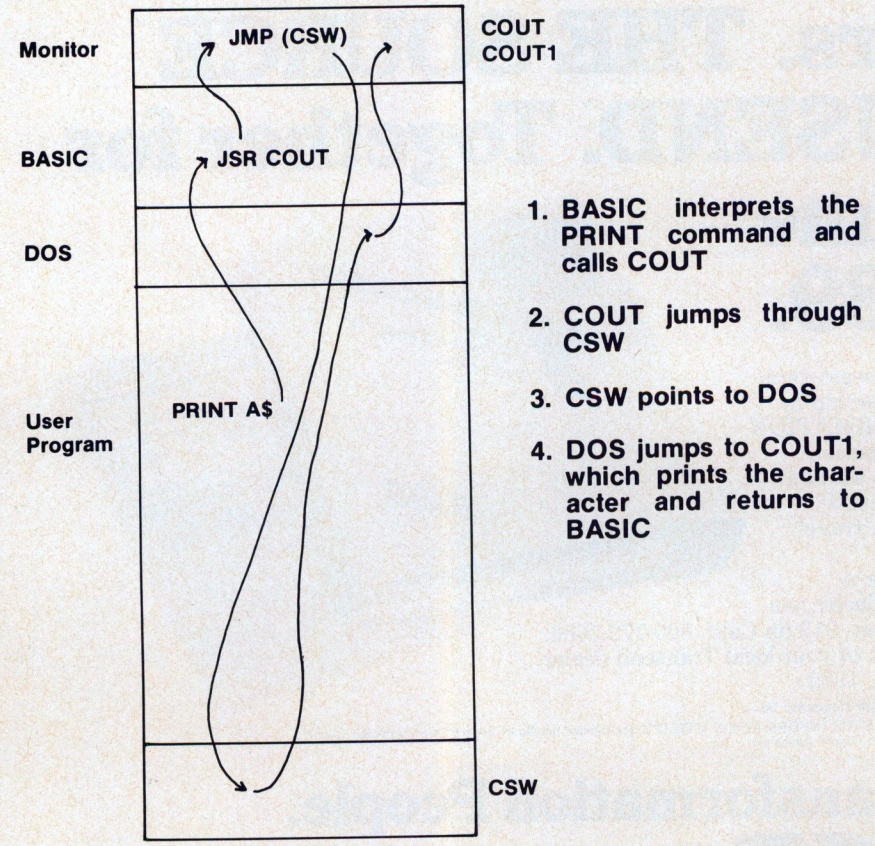

Figure 1. Character Output

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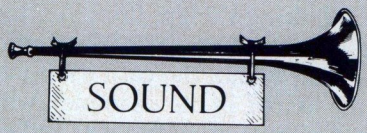

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Some of the other routines in The Routine Machine (plus others not listed) are:

SWAP: Swaps two string or numeric values.

TEXT OUTPUT: Prints with no "word break" on screen.

STRING OUTPUT: Input any string, regardless of commas, etc.

ERR: Stack fix for Applesoft ONERR handling.

GOTO, GOSUB: Allows computed statements. Example: **GOTO X * 5** or **GOSUB X * 5.**

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guage programmers can also keep DOS happy by simulating the DOS PR# command. This is done by loading the real CSW with the appropriate value (say $C100 to simulate PR#1), then doing a JSR $3EA. This subroutine copies the real CSW and KSW into DOS's personal versions, and then DOS puts its own addresses back into the real CSW and KSW.

The programmer working under DOS has basically two choices: let DOS take care of it all for you (the DOS PR# and IN# commands), or else totally disconnect DOS from CSW/KSW by putting his own addresses there (the BASIC PR# and IN# commands). In order to do the latter, it is necessary to change both CSW and KSW before any I/O takes place. Unless you cut off DOS at both places it will reconnect itself and confound your best attempts to redirect I/O. nothing will do but a stake through the heart!

We can make use of DOS to some advantage, though. We can use several peripheral cards at once if we call them directly rather than through CSW/KSW. Remember that a printer interface's output routine is located in a permanent memory chip on the card. If the card is in slot 1, then this routine is in the $C100 to $C1FF memory range. So we can call it directly: JSR $C100.

There is a small problem, though. $C100 is indeed the address that is placed in CSW when you do a PR#1. But most peripheral cards need to do some initialization work the first time they're called. After it does its initialization, it then changes CSW to be the address of just the output routine, sans initialization. This way, the next time COUT is called, the initialization part is skipped.

A user program, then, should not call $C100 for every character, but instead only the first time. You can find out where the "real" output routine is located simply by looking at CSW after the first character has been sent. It's best to do this without DOS bothering you.

Program listings 3 and 4 show a program which calls a SILENTYPE printer directly, without going through CSW ("PR#"). Listing 3 is the Applesoft program which sets things up, and listing 4 is the Assembly Language routine that actually does the output. They need to be run together. This program prints the same message on the screen, on the SILENTYPE printer, and into a DOS text file, simultaneously. It does this by telling DOS to open the text file. After this, DOS will take care of all output through COUT and CSW, sending it to the file. But the Assembly Language routine also sends the character to COUT1, which prints it on the screen, and to $C107, which prints it on the printer. Do not, I repeat DO NOT try to run this program with a printer other than a SILENTYPE in slot 1. This address, $C107, is the address of the SILENTYPE's output routine. Other interface cards cannot be expected to have an output routine in this same location. The PR#1 command in the main program is necessary to allow the printer to do its initialization.

You can call any peripheral card without going through the IN#/PR# business, but you must be careful of the following things: first, you must find out the addresses of the routines you want within the card itself (such as the $C107 in the example), which is not always an easy task; and second, you should not reference the locations $C800 through $CFFF, since the cards share these addresses and you may not know which card you're referring to at any given time.

We've now covered ALL of the Apple's special I/O addresses ($C000 to $CFFF), and taken some excursions along the way. Admittedly, there hasn't been much in these articles that couldn't be found in the Apple manuals (the Reference Manual in particular). However, I've noticed it is rather difficult to get very far in the Apple Reference Manual if you're not up on flip-flops and pinouts.

The I/O features of the Apple are some of its strong points. Because every peripheral card has all those addresses associated with it, designers can make cards that communicate with the Apple in an easy, straightforward manner. The Apple undoubtably owes much of its success to the fluency of its communication with the outside world.

Listing 3

```
]LIST
10  REM
MULTIPLE OUTPUT DEMO : TOM LITTLE
  CALL -A.P.P.L.E.   : JULY 1982

70  REM   (CALLER PROGRAM)

100 D$ =  CHR$ (4)
110   PRINT D$"PR#1": REM  INITIAL
      IZE PRINTER
120   PRINT D$"PR#0": REM  BUT TUR
      N IT OFF
130   REM
200   HOME : PRINT "MULTIPLE OUTPU
      T DEMO"
210   PRINT : PRINT "WARNING - USE
       ONLY WITH SILENTYPE": PRINT
      "PRINTER INSTALLED IN SLOT #
      1 -": PRINT "SEE ARTICLE TEX
      T FOR MORE INFORMATION"
220   PRINT
230   PRINT D$"OPEN MULT OUT TEXT"

240   PRINT D$"WRITE MULT OUT TEXT
      "
250   CALL 768
260   PRINT D$"CLOSE"
```

Listing 4

```
]ASM
                ********************************
                *                              *
                *     MULTIPLE OUTPUT DEMO     *
                *                              *
                *        BY  TOM LITTLE        *
                *                              *
                * Call -A.P.P.L.E. : July 1982 *
                *                              *
                *     (Output subroutine)      *
                *                              *
                ********************************
                *
                         ORG  $300
                *
```

```
                        15    PRINTOUT EQU   $C107       ; for SILENTYPE in slot #1 ONLY
                        16    COUT     EQU   $FDED
                        17    COUT1    EQU   $FDF0
                        18    CH       EQU   $24
                        19    CV       EQU   $25
                        20    *
0300: A0 00             21             LDY   #00
0302: A5 25             22             LDA   CV
0304: 48                23             PHA
0305: A5 24             24             LDA   CH
0307: 48                25             PHA
                        26    *
                        27    * It is necessary to save the coordinates of
                        28    * the cursor (CH and CV) so that COUT1 does
                        29    * not become confused
                        30    *
0308: B9 2B 03          31    LOOP     LDA   MESSAGE,Y
030B: 20 07 C1          32             JSR   PRINTOUT
                        33    *
                        34    * send the character to the printer
                        35    *
030E: 20 ED FD          36             JSR   COUT
                        37    *
                        38    * then to the file via CSW
                        39    *
0311: 68                40             PLA
0312: 85 24             41             STA   CH
0314: 68                42             PLA
0315: 85 25             43             STA   CV
0317: B9 2B 03          44             LDA   MESSAGE,Y
031A: 20 F0 FD          45             JSR   COUT1
                        46    *
                        47    * then to the screen
                        48    *
031D: A5 25             49             LDA   CV
031F: 48                50             PHA
0320: A5 24             51             LDA   CH
0322: 48                52             PHA
0323: C8                53             INY
0324: C0 41             54             CPY   #65
0326: D0 E0             55             BNE   LOOP
0328: 68                56             PLA
0329: 68                57             PLA
032A: 60                58             RTS
032B: D4 C8 C9
032E: D3 A0 CD
0331: C5 D3 D3
0334: C1 C7 C5
0337: A0 D7 C9
033A: CC CC A0
033D: C2 C5 A0
0340: D3 C5 CE
0343: D4 A0 D4
0346: CF                59    MESSAGE  ASC   "THIS MESSAGE WILL BE SENT TO"
0347: 8D                60             HEX   8D
0348: D4 C8 C5
034B: A0 D3 C3
034E: D2 C5 C5
0351: CE AC A0
0354: D4 C8 C5
0357: A0 D0 D2
035A: C9 CE D4
035D: C5 D2 AC
0360: A0 C1 CE
0363: C4 A0 C1
0366: A0 C6 C9
0369: CC C5             61             ASC   "THE SCREEN, THE PRINTER, AND A FILE"
036B: 8D                62             HEX   8D

--End assembly--     108 bytes     Errors: 0
```

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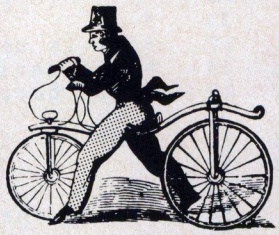

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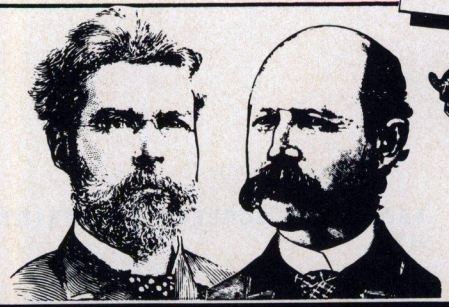

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A CALL —A.P.P.L.E. REVIEW:

Word Processors

Jeffrey K. Finn

EVERY time we think we've finally located all the word processors which operate on Apple computers, a couple more appear. We located several more at the West Coast Computer Faire which brings the total to almost 50 word processors to be reviewed.

"I've read the word processing reviews and I still don't know which one to buy. Please help me." This is a plea I hear many time when I answer a phone call from a fellow A.P.P.L.E. member. I truly wish there was an easy answer. Because word processors must allow for so many different situations and there are so many of them available, it is impossible to find a good fit for an individual situation without personally taking the time to learn about word processors or paying someone else to do the job for you.

The information provided in our reviews have two purposes. First, they attempt to give the reader an overview of what is available and second, they try to make the user aware of the complexity of the programs from which the user must eventually chose. The bottom line is that there is no easy answer. Time and effort will have to be spent to locate the word processor which best meets your needs and personal preferences.

Let me make it clear that I don't just hang up on the caller. Instead I try to give them a process to follow. So here in the great cookbook tradition, let me tell you what I tell my callers. Start by reviewing the *Call A.P.P.L.E. Word Processor Characteristics Checklist* to identify those features which are most valuable to you. Then take this sub-list and add anything you think of which is missing. Using your specially adapted characteristics checklist, decide which of the programs has the most of what you are looking for.

At this point, the shopper should take a test drive to get a feel for the word processor which appears to meet the need. Testing a word processor should be done using the type of documents which the user intends to produce on the system. The testing process can take from one hour to four or more hours depending on how well the program works with the particular user. The user should review at least two word processor programs in this way, in order to get a feel for how differently these programs can operate. There is no way to avoid spending this time, short of hiring someone else, if you want to have a word processor which truly meets your specific needs.

Feedback

Program developers' reactions and comments to our procedures have been extremely rewarding. One mentioned that they had found out alot about their product when they were forced to verify that our Word Processor Characteristic Checklist was correct. Still another word processor developer brought up the point that in order to implement one word processor or another some very crucial trade-offs have to be made. He mentioned the specific example of previewing on the screen what is supposed to be "exactly the way it will print" when doing a mail list merge.

What would you give to have unlimited UNITS on your Apple II*?

SOFTECH MICROSYSTEMS

If long sets of data and sometimes even short ones are to be merged into the final document, the displacement could have disasterous effects when least expected. The developer felt that a screen preview lulled the user into a false sense of security when the final printed document could be significantly altered by a single letter. Therefore, it was their decision to only approximate the final printed document in preview mode and warn the user that this was the case. A debate of these trade–offs could make for an interesting discussion.

This Month's Reviews

The *Correspondent* is a word processor whose reliable performance is the kind of program users have come to expect from Roger Wagner's Southwestern Data Systems. The *Executive Secretary* is loaded with features to meet a variety of needs including form letters and access to certain data base files.

Extra special recognition should be paid to the folks at Sofsys who bring you The *Executive Secretary*. Right on the diskette label the words "USER SUPPORT" are printed followed by a telephone number. That's as clear a statement of company policy as I've seen with respect to word processors. There is nothing like seeing something done right to make you feel good inside.

The Executive Secretary Word Processor

Traci Wynn Collins/reviewer

Writers are especially advised not to judge a book by its cover. In the case of *The Executive Secretary,* however, the notebook containing the users manual was a good indication of the great news inside. Flipping over the cover creates a professional copy holder so that a typist can easily refer to the manual while typing. Even if you aren't a secretary, everyone who has ever struggled to type corrections into a program while juggling manuals in their laps can appreciate the value of a finishing touch like that.

Glancing inside the manual is even more reassuring. The table of contents is organized as twenty five lessons and a "COMPLETE INDEX." An appendix refering to "installation" is where it won't get in the way during day to day use. Having used other microcomputer word processors, I know how frustrating it is to continually search for the real beginning of the manual behind the technical information which was only important once. When I read that the author was going to teach me how to use the program to perform 1) editing, 2) layout, and 3) production, I knew that I had finally discovered a microcomputer word processor written by and for typing professionals.

It is extremely difficult to write this review without comparisons to other microcomputer word processing systems. For it is in comparison that *The Executive Secretary* stands out, not merely useful, natural, comfortable and well thought out, but as simply amazing. I am writing this review on a commercial text processing system running on a PDP–1170 at work, where the Diablo is. I am cursing the lack of a Hayes Micromodem which is all that stands between me and preparing the text at home using *The Executive Secretary* for transmission to the 1170 using its built in electronic mail utilities. *This won't work without an Executive Secretary Program at the other end...JKF.* The program is simply better than the one at work. In the past I have used *Wordstar and W.P. Daisy* extensively on CPM systems. I am familiar with the features of *The Electric Pencil and Scriptsit* on the TRS–80. I own a copy of *Easy Writer – The Professional Package.* This program is better than any of them.

Better does not mean that *The Executive Secretary* has more "features" than any of them. Everyone of them has at least one or two features that it lacks. The CPM based systems in particular, have many more features. Better means that the features which are implimented are in a straightforward easy-to-use, easy-to-remember fashion, and better also means that this program has all of the features that a professional typist or writer is going to use day in and day out, over and over again.

Programmers who are looking for an editor, and who desire to while away their hours fiddling with their editor's code – "improving" it, or adding their own "custom" enhancements are advised to buy a different system. *The Executive Secretary* is simply not for them. While Sofsys, Inc. promises to provide some technical information upon request, so that someone like myself could solve their modem problem, there is no source code, and no advertised support for that type of activity. This program is not a general purpose solution to every problem that anyone might ever have on a computer. It is a nicely designed, completely self contained tool, for those people who have a text problem.

The Executive Secretary system includes an internal "cardfile" or database management system, an "electronic mail" system, and all of the utilities necessary for disk management such as formatting and copying. It provides a total environment for text management, gently prompting and guiding the user from the moment the Apple is turned on and the program disk autostarts. One important consideration for the prospective purchasers is that these are standard, not extra cost features. Since I lack the appropriate modem, I was unable to test the communications facilities. I will briefly discuss how the other subsystems are used, followed by a section on the disadvantages of the system, and a summation.

There are two distict functional modes in the editor: typing mode and editing mode. The creation of text is accomplished in the typing mode. Typing under the *Executive Secretary* works just like normal typing on a typewriter. Corrections in the typing mode are limited to destructive backspacing. The system does generate its own carriage returns and word wrap and it is fast. There is no need to slow your typing down so that the program can catch up with you.

One distinctive feature which can be unsettling unless you really did read your manual first, is that at the bottom of the page the typist is presented with a new blank page to type on with a single context line at the bottom. Nothing unusual about that to a typist, but if you are expecting the text to continue to scroll it is a shock.

Entering edit mode is accomplished via the ESC key. Once in edit mode, over 90 percent of all of the commands are single keystroke entries. For example, pushing the M key causes a marker to be placed in text at the current cursor position which marks the beginning or the end of a block. Likewise, pushing the Ctrl–U in typing mode marks the beginning or the end of an Underline. The cursor is restricted to the page it is on, but there are other, single key commands to move from page to page, to the end of the file, etc. There are very few two keystroke commands, and no three or more keystroke commands in the editor.

Although much of your justification is performed while you watch during text entry, and a paragraph can be cleaned up before your eyes after editing, *The Executive Secretary* draws a fairly clear distinction between editing and layout. The user can specify broad layout guidelines to cover the entire document at print time, but almost every conceivable command and flexibility is permitted to be locally exercised through commands which are typed into the body of the text. One example would be >cn which turns on centering until you type in >co which turns it off. These commands are placed on a line of their own and do not appear in the final document.

The value of this clear distinction between editing and layout really does not become obvious until you can see the power the system has to conditionally modify text at print time. You are not only able to merge data from a file such as a mailing list to get the name and address, but you can print specific areas of text based upon the value of a variable in the data file. For example, if you declare a title variable in one of your card files to contain such information as Ms., Miss, Mrs. or Mrs., you could branch on those values and send a different letter to unmarried, but socially conservative women than you would send to the men on your mailing list.

In addition to conditional printing, the system will keep track of numbered items you might refer to such as slides or illustrations finally assigning numbers to each of them at print time, once you are sure they are all there, as well as indexing and abbreviations. All of these features are implemented through embedded commands which will disrupt the visual impact of the text in your file while you are editing it. You can preview the document on the screen, but you do that by printing to the screen, not in the editor.

The data management facilities of the program are fairly powerful. In addition to the creation and recovery of text files organized as cards with lines rather than as records with fields, the system can create search and sort indexes on any of the lines for the purposes of using a subset or a specific order. It can also read the files that are produced by most of the popular data mangagement systems sold for the Apple, such as CCA, D.B. Master Utility Pack, Visifile, Information Master (most Dif files), or the Data Factory. Up to one hundred fields or lines per card or record can be inserted into images of your text file. If it is appropriate, a line in the built–in card file can be summed and totalled or sub–totalled and reports can be generated directly from the card files by the user's specifications.

These infomation management capabilities in addition to the conditional printing capability make this program the system choice for clubs, organizations, or political parties. This combination of decision making logic and text processing is certainly unique in my experience and extremely valuable for any type of public relations or direct membership appeal campaign.

There is, however, a worm in every Apple and there are disadvantages to any system. Specifically, *The Executive Secretary* does not hyphenate, nor does it automatically or semi-automatically handle footnotes and citations at all. Hyphenation is a matter of aesthetics. I have always hated it, and I have always disabled it on any system I used which provided it as an option. If the right and left hand justification is attractive, and it is in this case, then hyphenation is an abomination, at least to me. If it isn't to you, then, you are forwarned. Footnotes are another matter, although they are seldom useful in business reports or letters, they have a firm position in academic writing.

What would you give to have your Apple II able to configure to any peripheral?

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EVALUATION

This is slowly changing, but may be critical to specifications within the body of the text. What few footnotes you have the courage to present to an editor are included in an appendix so that he can worry about formatting them on his type setting machine. I am fortunate in that they are a problem I will never need to force upon my system, others of you are probably not in that position.

The Executive Secretary was designed to use two disk drives, an 80 column display board with software switching, and a shift key which is implemented in hardware. The no-solder shift key modification provided with the program for newer Apples is the only feature which is absolutely required, various compromises have been implimented for single disk systems. These are compromises.

Every step you take away from the target system increases the awkwardness of the system, but it is possible to grow into your ultimate system slowly. I have a single disk system and 80 column display without the software switching. In fact, my dealer never told me about software switching options. I found the display switching more irritating than the lack of the second disk drive and I plan to remedy that situation almost immediately. This opportunity to move upward in hardware within the same system is a significant advantage over other packages which may have one program for 40 columm display users and another different and additional cost program for 80 column display users.

If you haven't noticed, I am sold. I hope I have made it clear that this program is probably not right for every Apple owner, but if you are one of the individuals that word processors were originally designed for, I can not recommend it enough. There is finally a microcomputer word processing system which should make the commercial vendors nervous. The quality of the documentation and the user interface compares quite favorable to anything on the market today, and the information management capabilities are rare if not absent anywhere else.

What would you give to have TURTLEGRAPHICS, with automatic scaling, and four graphic modes, including HIRES and LORES, on your Apple II?

SOFTECH MICROSYSTEMS

WORD PROCESSOR EVALUATION

The Correspondent

L.K. Bumgarner/reviewer

The Correspondent, evaluated here as a word processor program needs to be considered more correctly as a "text editor." This is the description which its own creators have given it, and certainly one which better fits it. The program is typical of many that have been created for a single purpose and been expanded over time to satisfy the desires of previous purchasers. That is, the program, while quite sophisticated and flexible in the many features it provides, fails to provide the essentials of a true "word processor." In fact, its creators intended the program for the casual user having an occasional letter to write. That function it can perform quite well, and it certainly has use in other text editing fuctions that are not too demanding. Considered in that light, the program is a good value at its current price of $44.95.

The program comes on one disk, supported by a 66 page user manual. Surprisingly, these 66 pages are none too many to describe the many features and controls within the program. In fact this evaluator would like to have seen a bit more description provided in selected areas. This is one of those programs that can be copied up to three times, and as usual it is recommeded that a copy be made to work from and the original disk saved. The new purchaser will soon find that the program instructions are a bit vague, yet force the user to answer a Y/N question to continue before he is advised of the proper position of disks and drives. This produced that instant sinking feeling that responding to the question will blow one of the precious three copies that are allowed. Well, it does not; but in a package of this type, such vagueness should not exist.

Unfortunately the manual makes no mention of what will happen next, once this question is answered and the copy process begins. The disk drive produced no less than six consecutive buzzes which smack of the dreaded I/O error sound, over a period of several seconds. Having already produced doubt in the user's mind as to correct procedure, this symptom is likely to produce the "reset reflex", causing the user to abort the copy prematurely.

Another minor irritant we found was that some new features had been added to the programs after the documentation was printed. These were to be covered in a text file supplied that could be read by the *Correspondent* program and printed out for reference. Unfortunately, we could only view this material on the screen, since attempts to print it out resulted in obtaining about half of the text followed by endless line feeds. A call to the vendor (long distance) produced a suggestion we might try to correct the situation, but it did not work. This leaves the user in the position of having to manually copy pertinent information from the screen. Again, not good testimony to the computer art.

Enough griping about the usual mundane deficiencies we so often find in commercial software these days. Let's get to the essentials of this program as a word processing device.

The program is divided into two primary modes; one for scrolling and one for data entry and editing. This provides the ability to include many more features to the user, but also makes for confusion by the use of similar control codes between the two modes. Also, considerable switching between the two modes is necessary for the user to know where he is within the document being prepared. This becomes frustrating since fundamental movements of the cursor respond to different control codes in the two modes.

Most commands are mnemonic, but still confused by whether they require a preceding control key or not. Most notable of the commands that are not mnemonic are those that govern scrolling, compounded by the fact that they are also different between the two modes. For example, to scroll down in the scroll mode, the left arrow is used. In the edit mode this is achieved by a control "J." Other movements are equally non-similar between the two modes. We also found the cursor to both disappear and lag behind during fast editing moves.

The scroll mode is comprised of no less than 37 separate commands, each accomplished by the press of a single key or a control key and letter. Twenty alphabetic keys are used singly, and fifteen control key sequences are used. This makes it almost impossible for the user to remember whether he wants a "d" or a control "d," unless he uses the program frequently enough to etch the commands into his mind. To compound this problem, some keys are cancelled by a return and some operate on a toggle basis.

The edit mode is similarly designed. Nineteen control key sequences are used, two different escape sequences for capitalization, and three special control codes using dual control key sequences on two of them. All of this provides a lot of capability, but renders the program almost unusable unless a list of all these codes and their functions is kept handy during operation. The authors have wisely included two help menus to aid the user, but it is still necessary to consult the manual for further description in many cases.

As far as speed of the program, I found it to compare very well with the faster word processors so far tested in virtually every category. Search time is remarkably fast, but requires the operator to examine each occurrence and either retype for replacement or carriage return to move to the next qualifying occurence. No global replace is available. One notable deficiency of this approach is that the program always begins the search at the beginning of the text, and gives no provision of page or line numbers when an occurence is found. This necessitates a switch back to the scrolling mode where page and line numbers are provided, with a consequent return to the edit mode in order to achieve the replacement. Nowhere in the edit/data entry mode are line and page number provided. Consequently, when typing in text, one never knows just where they are without switching back and forth to the scroll mode. This is not particularly difficult, but certainly irritating and counter-productive to speed of entry.

EVALUATION

One feature described in the manual as "scroll down one page" actually turns out to be 21 lines. Another reference in the manual says this is 21 lines. If it were, three consecutive keystrokes would bring the top of the next page to view, given that one started at the top of the previous page. Such a feature would have been useful indeed. But at the present scroll of 21 lines, three strokes brings us to line 64 of page 1; succeeding multiples of three keystrokes continue to accumulate this error, requiring the user to arrive at the next page top. Somehow it seems that this should be correctable.

A feature I really liked was the ability to "freeze" up to nine lines at the top of the screen. This feature becomes very useful in forms design and other columnar work, where one may not wish to utilize the tabs that are available in the program. It also allows the operator to compare different sections of text quite readily.

Another nice feature is an optional display mode. When entering text in 80 columns, the screen automatically switches back and forth between the right and left sides as typing takes place. In order to facilitate proofing via the screen, the program allows the operator to select an optional display of 40 columns, thereby cutting each line in half and folding it underneath for easier reading. This works quite well with the exception of an occasional split word.

The procedure described in the manual to reset left margins did not work as indicated. We later found that this was covered in the disk addendum provided, but was in the portion which we were unable to print out. A call to the support organization cleared this up for us.

It is possible with this program to embed control codes within the typed text to perform printer control functions. I found that I was able to activate many of the nifty features of the Epson MX-80 Graftrax with this feature. Some experimentation could prove quite rewarding in this area.

What would you give to develop programs for the IBM PC, TRS 80 Model II, T.I. 99/4 Home Computer, and Xerox 820 on your Apple II?

SOFTECH MICROSYSTEMS

WORD PROCESSOR EVALUATION

Perhaps the most noticeable features missing from the package are the absence of page breaks, generated page numbers, automatic double spacing, and page and line indicators in entry mode. In this respect, *The Correspondent* functions much like a regular typewriter, i.e., the operator must actually type where he wants the page to end and begin, etc..

Such features as block text move and copy are available in this package and work very nicely. It can be used in many ways as a data base manipulator, a letter generator, and can perform such features as columnar addition for checking. All in all it is quite flexible and versatile, but it is not suitable for the professional typist as a word processor. For the computer hobbyist with some text editing requirements who is not overly concerned about speed, and willing to spend some time with the manual on a periodic basis, it should serve fine.

Reply to Bumgarner's review

Roger Wagner/Southwestern Data Systems

Thank you for sending me a copy of the upcoming review of our product "The Correspondent." I appreciate the opportunity to have *Call —A.P.P.L.E.* evaluate our products and inform their membership about the relative merits of the items we offer.

I would like to make a few comments, however. These are offered more as observation and opinions, rather than a specific request that any of the editorial material be changed.

After reading the review, I couldn't help but feel that this particular reviewer felt that the prime purpose of his job was to find any shortcomings of anything reviewed, rather than present a balance of its advantages and disadvantages. I believe the result fails to give your readers what they deserve in both fairness and complete information.

Some cases in point. Mr. Bumgarner mentions that The Correspondent is "one of those programs that can be copied up to three times...." For heavens sake! *The Correspondent* was *The First* program ever to offer the user this option, and S.D.S. as far as I know is the *only* company to use this system for the majority (if any) of their software line! At least a little credit when we do something right, OK?

After spending a considerable amount of editorial space on the shortcomings of the copy program, he then mentions his difficulty in printing out the addendum file. I do apologize for not having located S.D.S. in his home town (so as to avoid the long distance phone call), but his inability to print out the file would seem to be one of "pilot error" in this case, as we have never had anyone else experience any difficulty with the file, and there is nothing complicated in printing out the file that has slowed anyone else down. In

COMPUTER CONSULTING SERVICES

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Hardware Requirements: APPLE II PLUS (48K), DOS 3.3
Dual Disk Drives, Printer

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— Reconcile monthly bank statement
— Purge an existing account
— Directory assistance
— Edit account information
— Change System parameters
— Change System password

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8 entries per client, average

(These figures are for active account entries. Records from client accounts with zero balances are periodically removed with the Purge function.)

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fact, I remember his specific call, because it was so unusual in the problem he was having. I do think, *especially as a reviewer,* he should have pursued the problem to its solution to determine if it was a software error, or a matter of having forgotten to turn his printer on.

Unfortunately, the rather negative tone persists throughout the article, in spite of his final conclusion that the program in the final analysis will be quite suitable to a number of people. It is sad that towards the end of the article some of the nicer features of the package seem to start occuring to him.

To perhaps even out the information, I would like to offer at least a few of The Correspondent's positive points:

1) User tutorial at beginning of manual allows a computer novice to easily get far enough in the program to enter, save and print a letter.
2) In a time of rapidly increasing software prices, The Correspondent offers a *very* attractive alternative to someone who doesn't want to spend $200–$300 to type a letter.
3) The Correspondent is one of the few products at any price that gives an accurate representation of what the final text will look like, without requiring additional hardware. For producing highly formatted text such as forms (or tests, etc. for teachers) the program has very few competitors – especially at the price!
4) The Correspondent is easily LISTed and modified, and we provide a full-time support staff to help users in any area they require. Although I do not expect a person to have to modify any part of my programs, his own particular preference about how many lines the "page-scroll" should be could have been easily handled while he was calling about his difficulty on printing out the file.
5) The Correspondent is one of a very few programs that automatically configures itself for a variety of user preferences (including printer control and overall program operation), with a minimum of effort from the user.
6) the manual includes a fairly good practice exercise section that goes into the TECHNIQUES of using the varius commands available in the program. Many software products explain the raw commands available in using the package. Few offer advice on how to combine commands to achieve a desired goal.
7) The Correspondent offers a tremendous number of additional utilities and items of interest. These include the ability to send letters to other Apple users directly on diskettes, to put bi-directional scrolling in a user program, along with Correspondent generated text, a form letter driver example, and many others.
8) The fact that compared to Applewriter, The Correspondent is an extremely viable competitor, allowing much more flexibility in terms of the final document created. The Correspondent also gives the user complete flexibility as to whether to save his file as a binary or actual text file format.
9) The ability to link files to unlimited sizes. This is useful for printing documents, but takes on tremendous potential when using The Correspondent as a free-form database (examples provided both on disk and in manual). Combined with a hard-disk, it is possible to search 10 Megabytes of data for a single occurence of a string, located anywhere within the file.

The Correspondent has two main drawbacks. It does not automatically break pages, and words are not automatically moved as whole units to the next line when a character insert or remove is done. (See the accompanying flyer on the package if you are interested) Other than that, it compares quite well against a variety of packages. Even the reviewer's own chart show that.

Well, I certainly have gone on here, and I appreciate your patience in bearing with me through all this. I have very personal feelings about our products, and particularly the ones I have written, but I think I am still reasonably objective in the points I have raised. I look forward to your comments.

Perhaps we could try another.

Sincerely,
Roger Wagner

Benchmark Tests for the A.P.P.L.E. Word Processors Evaluations

	The Correspondent	Executive Secretary
Timing (in seconds)		
Initial boot-up	37	21
Retrieve text	21	10
Store text	26	8
Search	1	2
Search & Replace	Not Auto.	Not Auto.
Printing		
Go to **print** mode from **editor** mode	0	55
Go to **editor** mode from **print** mode	0	55
Print time for test document (Approximately 8,000 characters)	201	415
3 Keystrokes Required:		
Search	1	
Search & Replace	Req. operator each occurrence	
Change a letter	2	

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The most advanced and easiest to use telecommunications program for use with the MICROMODEM II™ or the Apple COMMUNICATIONS CARD™.

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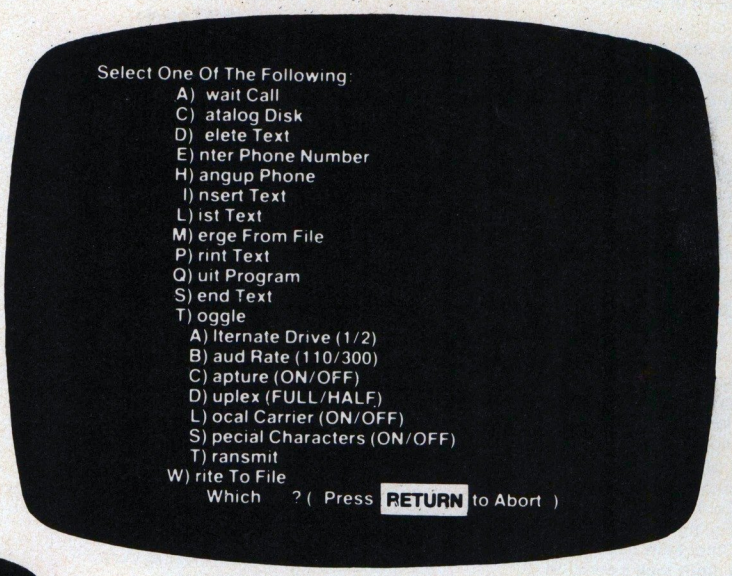

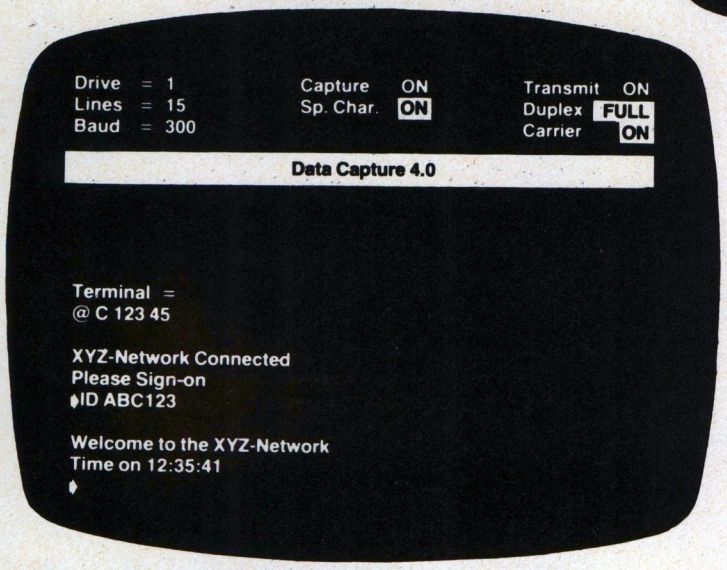

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WORD PROCESSOR EVALUATION

	The Correspondent	The Executive Secretary
INITIAL REQUIREMENTS		
Program Cost	$59.95	$250
RAM	48K	48K
Applesoft in ROM	Language Card or X	X
Lower case adapter	Opt.	40 Col. Mode
Number of disk drives	1+	1+
Other hardware modifications		Shift Key
80-column	Opt Partial Use	Opt.
Z-80 Softcard		
RAM Board		
Special Printer		
Special interface card		
TEXT INPUT FEATURES		
1.1 Upper/Lower case display		
Upper case only		
Inverse upper case	X	
Hardware adapter	Opt.	X
High resolution screen		
1.2 Shift key operation		
Escape key sequence	X	
Control key		
Equipment modification	Opt.	Req.
Other keys used		
1.3 Shift lock operation		
Escape key sequence	X	
Control key		CTRL "L"
Equipment modification		
Other keys used		
1.4 Screen display input		
Maximum line length display	40 or 80 w/card	40 or 80 w/card
With scrolling for whole line		
1.7 Automatic formatting of words		
Moves full word to next line	X	X
Automatic indentation		X
First line of new paragraph		X
Temporary for full paragraph	X	
Hyphenation		
Prompt only		
User approves each case	X	
Fully automatic		
1.8 Tabbing		
Available	X	X
Text shows effect during entry	X	
Justification		
Left	X	X
Right	X	X
Center	X	
Decimal Point		
1.9 Status displayed for:		
Current operating mode	X	X
Cursor at column "n"	X	
Cursor at text line "n"	X	
Left margin	X	
Right margin	X	
Top margin		
Bottom margin		
Tabs stops	X	X
Space remaining for more text	X	Automatic File Extension
Other		

	The Correspondent	The Executive Secretary
1.10 Reset page specifications in text		
Margins	X	X
Tabs	X	X
Page breaks		X
1.11 Accept text files it didn't create	X	X
1.12 Accept text from telecomm. port		X
1.14 Formatting for text output		
Center lines	X	X
Underlining	User Embeds CTRL CHRS Used by Printer	X
Bold printing		X
Alternate color ribbon		X
Two-pass printing		X
Super-script/sub-script		X
1.A Automatic checking for spelling		
1.B Maximum text length in one file	?	Full disk in 3,400 word Sub-files
1.C Drops characters from fast typist		
EDITING		
2.1 Underlying document format		
Line oriented editing	X	
Auto adjusts subsequent lines	X	
Document oriented editing		X
Insert text at cursor position	X	X
Delete text from cursor by:		
Character(s)	X	X
Word		X
Sentence		
Paragraph		
Document page		
End of document		
Beginning of document		
Screen line	X	X
Top of screen page		
Bottom of screen page		
Text marker	X	X
Automatic adjustment of text:		
On screen	X	X
In document	X	X
2.2 Cursor positioning — move by:		
2.2.1 Character	X	X
Multiple characters		
Word		X
Sentence		
Paragraph		
Document page		X
End of document	X	X
Beginning of document	X	
Screen line	X	X
Line number		X
Top of screen page		X
Bottom of screen page		X
Scroll forward through text	X	X
Scroll backward through text	X	X
2.2.2 Copy text within file	X	X
Move text within file	X	X
Save portion of text to new file	X	X
Insert text from another file	X	X

	The Correspondent	The Executive Secretary
2.2.3 Search and Replace		
Search Only		
Command finds and displays:		
First occurrence		X
All occurrences	X	
"n"th occurrence		
Search and Replace		
Command replaces:		
First Occurrence		X
All occurrences	X	
"n" occurrences		
Action completed:		
Automatically		
Manual override	X	X
2.4 Operates on multiple file document	X	
2.6 Can edit:		
Page breaks		X
Page number location		X
Headers (page title) location		X
Date		Opt. w/clock
2.7 Columnar editing		
Swap columns		
Addition checking	X	VIP card File
2.8 Are edit macros available for:		
Inserting formatting commands		X
Inserting phrases into the text		X
2.A Indices capabilities		
Automatic creation of indices		X
TEXT STORAGE AND RETRIEVAL		
3.1 Uses		
3.4 Program accessible for modifying		
3.5 Program back-up		
Disk copyable by std. copy util.	Up to 3 copies	
3.6 Text file back-up		
Prompts user		X
Automatic procedure		
Can use std.disk copy utilities	X	
1-drive copy program provided	X	X
2-drive copy program provided		X
3.7 Form letter capability		
Included in basic program	X	X
Extra cost item		
3.8 Text file documentation		
Length of document title	30	15
Content description phrases		X
Allowed		Portion not used for title
Length of phrase		
Indication of document author		
Dating		
Document originated		CCS clock
Document last worked on		CCS clock
Total time document worked on		
Size of the document	X	X
3.9 Amount of text actively in memory	Approx. 18,000	16,000
3.A Does the program support:		
D.I.F. data formats		X
Other data base files	X	X

	The Correspondent	The Executive Secretary
3.B Displays remaining space on disk	X	X
OUTPUT		
4.1 Printer configuration:		
Automatic		
Semi-automatic:choices from list	X	X
Prompts operator in detail		
User changes lines in program	Available	
4.2 Printer control		
Incremental spacing		
Top-of-form alignment	X	
Tabbing	X	
Change print fonts in document:		
Pause for print wheel exchange	X	
Reconfigure dot matrix on fly	X	
4.2.1. Letter space justification	X	
4.2.2 True proportional spacing		
4.4 Forms control		
Continuous form		X
Single sheet		X
Variable length	X	X
4.5 Page numbering		
Suppressed any page		
Continue any page		
Chapter relative		
4.6 Footnotes		
Completely automatic		
Semi-automatic		
4.7 Responds to printer problems		
Out of paper		
Out of ribbon		
Other		
4.8 Print Spooling		
Can print a file while editing another		
4.A Screen preview of final document		
Maximum line length displayed	40 or 80 w/card	84
With scrolling for whole line	X	
Pause key	X	X
Pause at page breaks		X
Escape from viewing entire text		X
Edit page breaks at this time		
4.B Chains files into one document — (automatically)	X	X
HUMAN ENGINEERING		
5.1 Mnemonic quality of commands	Average	Excellent
5.2 Verifies dangerous commands		
Delete document file	X	X
Save file with same name	X	Not Allowed
Quit program		
Clear memory space for new text	X	X
Load file that overwrites memory		Not Allowed
5.3 Recover from command errors		
Unwanted deletion of text		
Unwanted deletion of file		
5.4 Operator assistance		
Operation and error messages		
English	Std. Apple Messages	X
Computer jargon		
Numbers only for table look up		
Help file on-line	X	
5.5 Structure of program		
Separate edit and print programs		
5.6 Emergency recovery provided for:		
System crash — Not power outage	X	
Memory full error		X
DOCUMENTATION AND ASSISTANCE		
6.1 Allows program to be used easily by:		
Average computer hobbyist	X	
Apple user (not hobbyist)		
Average clerical personnel		X
6.2 Identifiable documentation parts		
Intro.-Program purpose & theory	0	+
Tutorial		
Written — using examples	0	0
Computer assisted instruction		
Each function-detail description	0	+
Technical Data		
System requirements		+
Structure of files		
Interfacing with peripherals		
Annotated source program listing		
Full listing		
Part: for user modifications		
Index to documentation	0	+
Quick reference		
Specific section in manual	+	
Pocket reference card		0
Keyboard function chart		
Keyboard key function labels		
On-line screen display	+	
6.6 Program supported by telephone	X	X

NOTES:
Numbers in left-hand column refer to word processor evaluation criteria published in **Call —A.P.P.L.E.**, September, 1980.
A letter suffix indicates an addition since September, 1980.

Key
X = Characteristic present
R = Required
Opt = Optional

\+ = Good
0 = Acceptable
\- = Poor

blank = Characteristic not present or not applicable

/// CORNERS

KEYPAD JOYSTICK

Richard V. Grant

YOUR numeric keypad can be an eight-direction joystick! Any group of keys can become a joystick with enough "IF" statements. The numeric keypad, with its regular pattern of numbers, lends itself to a dramatic short-cut. Consider the following:

```
10  GET A$: A = VAL(A$)
20  UY = INT((A-1)/3)-1:UX = -
    3*UY + A-5
30  X = X + UX:Y = Y + UY
```

Line 10 accepts a keystroke and generates the numeric value "A." Line 20 is the meat of the program, generating unit vectors in the X and Y direction. Line 30 updates the X and Y values controlling point position.

The actual graphic commands are different on the Apple /// and the Apple][and also depend on the intent of the programmer.

In our simple example, we may wish to add the line:

```
15  IF ASC(A$) < 49 OR ASC (A$)
    >57 THEN 10
```

Line 15 makes the routine ignore all keys except 0-9. On the other hand we may wish to insert special options for some letter keys....but that gets into a whole, "You-draw-it," program. Here we just have a short routine which can be used in many programs.

A CALL —A.P.P.L.E. QUICKIE:

PATCH FOR FILEDUMP

William Steinberg

The June 1982 Call —A.P.P.L.E. has a great article on a new DOS command "Filedump". As it now stands, however, the call to print is to COUT1 at $FDF0, the Apple screen. This will cause the text file to be printed to the 40 col screen, even if you have an 80 col board or a printer "hooked". To have this routine print to anything hooked to the DOS I/O, change the patch at byte $BCEB from $F0 to $ED. This will change the print call to COUT at $FDED, and if your printer is on, the file will be printed... If you're using an external terminal, or an 80 col card, or even a modem, the file dump will go there too.

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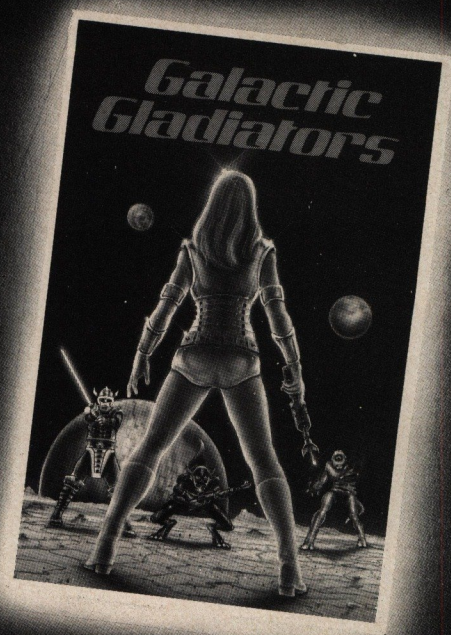

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A CALL —A.P.P.L.E. UTILITY:

RESTORE TO A LINE NUMBER ROUTINE

Lee Reynolds/Call —A.P.P.L.E. Staff Writer

FOR quite some time I've been looking for a good application for Applesoft's USR function and at last I've come up with one. The routine described in this article also adds a nice extension to the language, in allowing you to RESTORE to a line number, rather than always to the very first DATA statement in the program.

This capability of choosing which DATA statement to RESTORE to could be quite useful; I'm sure that any creative programmers who might need this sort of thing will be able to think of an application. The general idea behind it is this: suppose you have several categories of things in your DATA statements, and also suppose that you have grouped them by line number in each category. That is, lines between 100 and 200 might contain your first category, lines between 200 and 300 your second category, etc. Now, if you have done this, wouldn't it be convenient to be able to have a statement like RESTORE 200 in order to place the current DATA pointer back to the first item in category 2? Unfortunately, Applesoft doesn't allow this. The following short routine can be inserted in your program in order to be able to set up the USR function to act just like this sort of statement:

```
10  A$="300:20 52 E7 20 1A D6
    90 21 A0 04 B1 9B C9 83 D0
    19 18 A5 9B 69 04 85 7D A5
    9C 69 00 85 7E A5 50 85 7B A5
    51 85 7C A0 00 F0 02 A0 01 A9
    00 20 F2 E2 60 N D9C6G"
20  FOR I=1 TO LEN(A$): POKE
    511+I,ASC(MID$(A$,I,1))+128:
    NEXT: POKE 72,0: CALL -144
30  POKE 11,0:POKE 12,3
```

The first two lines above put the machine language USR routine into memory by use of S.H. Lam's method. The third line sets up the USR vector to point to the start of the routine. The routine has been stored in "page 3" (hex $300 to $330), but it is entirely relocatable, so you could place it somewhere else instead. If you do this, don't forget to modify line 30 above also!

Now, as to how you use it; this is an example:

```
80  X=USR(NUM) : REM RE-
    STORES TO LINE NUMBER
    NUM
```

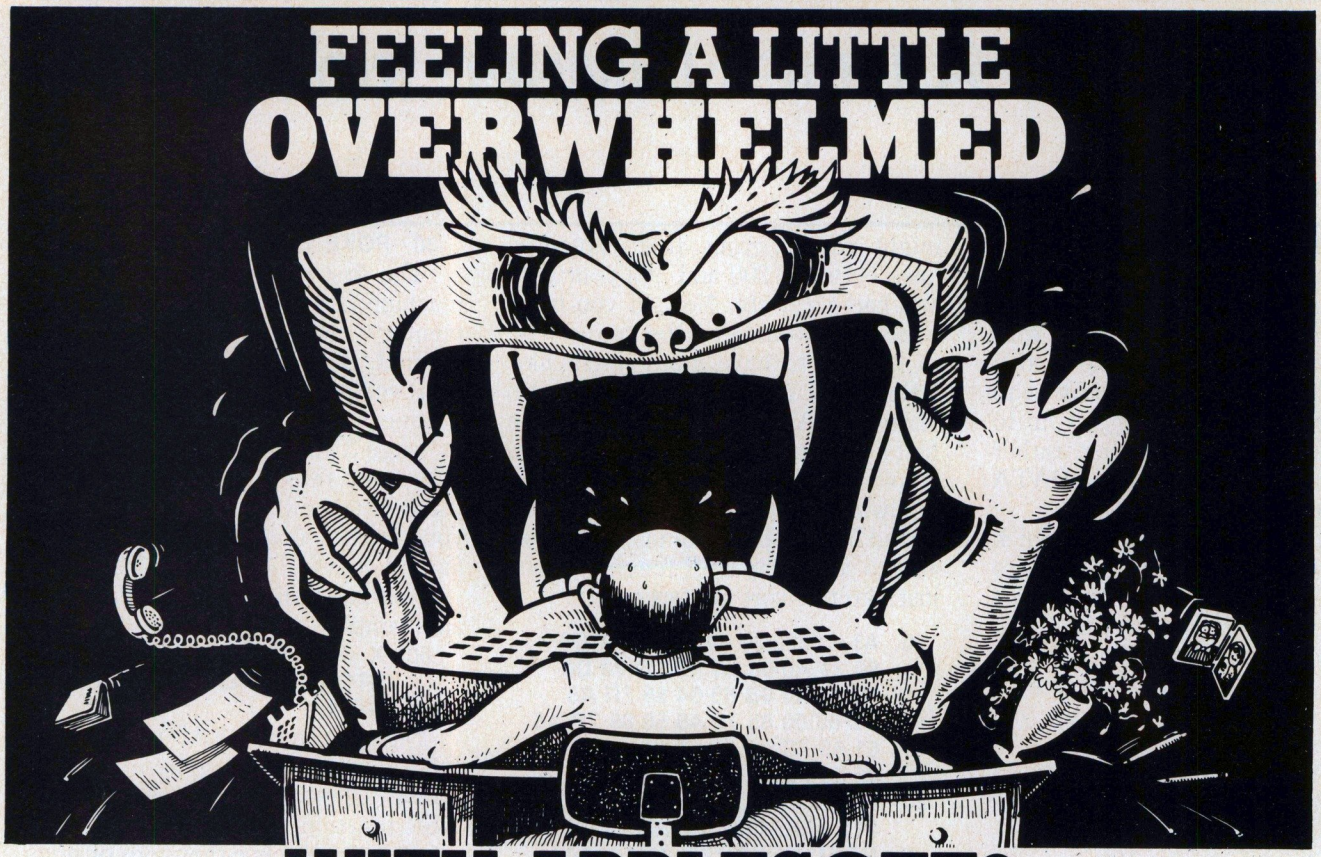
Now your next READ will take its DATA from the first item on line NUM. The value returned by the USR function (and put into X in the above example) is either zero or one. If zero, everything worked O.K. A value of one means an error, which can be one of two kinds: 1) the line NUM isn't in your Applesoft program, or 2) it is, but that line is not a DATA statement! While you're checking your program out, you should probably test the value X.

Here is an assembly listing with comments explaining my routine; it makes use of several routines within the Applesoft interpreter itself:

Anybody got any other neat ideas for using the USR function? If so, I'm sure the readers would like to hear from you.

```
                    ********************************
                    *                              *
                    *   RESTORE to a line number   *
                    *        by  Lee Reynolds      *
                    *                              *
                    * Call -A.P.P.L.E. : July 1982 *
                    *                              *
                    ********************************
                    *
                    LINNUM   EQU  $50
                    DATLIN   EQU  $7B
                    DATPTR   EQU  $7D
                    LOWTR    EQU  $9B
                    FNDLIN   EQU  $D61A
                    GIVAYF   EQU  $E2F2
                    GETADR   EQU  $E752
                    *
                    *
                             ORG  $300
                    *
0300: 20 52 E7               JSR  GETADR     ;Convert USR argument to integer
0303: 20 1A D6               JSR  FNDLIN     ;Find the Applesoft line
0306: 90 21                  BCC  ERR        ;Branch if not found
0308: A0 04                  LDY  #$04       ;Make sure fifth byte in line is the DATA token
030A: B1 9B                  LDA  (LOWTR),Y
030C: C9 83                  CMP  #$83
030E: D0 19                  BNE  ERR        ;Branch if it isn't
0310: 18                     CLC
0311: A5 9B                  LDA  LOWTR
0313: 69 04                  ADC  #$04       ;Point Applesoft's current data
0315: 85 7D                  STA  DATPTR     ;address to the new DATA token
0317: A5 9C                  LDA  LOWTR+1
0319: 69 00                  ADC  #$00
031B: 85 7E                  STA  DATPTR+1
031D: A5 50                  LDA  LINNUM     ;Update Applesoft's value for
031F: 85 7B                  STA  DATLIN     ;current DATA line number
0321: A5 51                  LDA  LINNUM+1
0323: 85 7C                  STA  DATLIN+1
0325: A0 00                  LDY  #$00       ;Low byte (zero) of value to return in "X"
0327: F0 02                  BEQ  OK
0329: A0 01          ERR     LDY  #$01       ;Low byte (one) to signal error
032B: A9 00          OK      LDA  #$00       ;High byte of integer
032D: 20 F2 E2               JSR  GIVAYF     ;Convert from integer to floating point
0330: 60                     RTS             ;Return to Applesoft program
                --End assembly--  49 bytes     Errors: 0
```

FEELING A LITTLE OVERWHELMED



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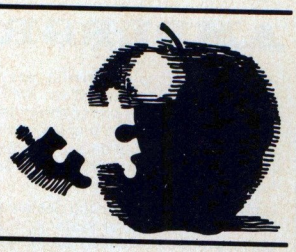
SO WHAT DID YOU EXPECT?

UNRAVELING AN APPLESOFT PUZZLE

Cornelis Bongers/Call —A.P.P.L.E. Staff Writer



Introduction

EVERY computer user is confronted with confusing situations regularly. In particular, people who just start programming, frequently encounter problems not mentioned in any manual. The reaction of almost every beginner when their computer refuses to execute their instructions, or worse, when it wanders off in never-never land for the first time, is that there must be a system failure somewhere. I vividly remember running memory tests almost daily during the first months I had my Apple, as I was convinced that a hidden bug in the hardware had to be the cause of my numerous system crashes. However, time and again it appeared that the crash was caused by programming errors. Instead of testing memory, I began looking more critically to my own efforts. This worked alright till, about two months ago, I spent three days searching a mysterious bug in a complex machine language sort program. Finally, it occurred to me that a hardware failure was not completely to be excluded, so I got the (dusty) diskette with the memory test. On execution, the test reported — more or less to my surprise — a RAM failure. After having replaced the bad RAM, the program worked fine. Although the odds of a hardware failure versus a program error are very low, it may be worth the trouble to check your system now and then.

When programming in BASIC, a third potential *crash causing* factor must be taken into account, namely Applesoft. Applesoft has some internal bugs, most of which are well documented by now. However, there still are *fortunately* some opportunities to discover new mysteries. One of these was pointed out to me by Val Golding (who saw it in *Softalk*) and it occurs in the following program.

```
5   INPUT A$:RETURN
100 TEXT:HOME:VTAB 10:PRINT
    "APPLESOFT ERROR"
```

Enter the program exactly as shown and next, enter the *direct* command GOSUB5 (don't put a blank between "GOSUB" and "5"). On the input request, type ERR. Contrary to what you may expect, the program will print the text "APPLESOFT ERROR," although line 100 is not executed at all. To show how stubborn the Apple can be, delete line 100 by entering 100. Next, execute the GOSUB5 instruction again and you see that the text "APPLESOFT ERROR" will still be displayed.

The cause of the strange behavior of the Apple is neither a hardware problem nor a bug in the program, but rather the occurrence of a situation not foreseen by the creators of Applesoft. The error is caused by the mixture of immediate and deferred mode instructions that are being executed. Furthermore, the error occurs not only in Applesoft, but also on the CBM 4032, as was checked out by my colleague Hans Geilenkirchen.

Explanation

When entering a sequence of immediate mode instructions, these are tokenized and stored in the input buffer. Then Applesoft executes the instructions (just like a normal program line), but it sets a pointer to indicate that the execution mode is immediate. The pointer corresponds to the high byte of the current line number: this byte is set to $FF if the mode is immediate. As is well known, not all BASIC commands are allowed in immediate execution mode. For instance, the INPUT and GET statements are forbidden. The reason is that by specifying INPUT A$ in immediate execution mode, the input buffer would be used for two purposes simultaneously. The users input on the INPUT statement is namely also stored in the input buffer, which would have the consequence that the user's input overwrites the sequence of instructions (that were previously stored in the input buffer).

Since the GOSUB statement is allowed in immediate execution mode, we have the opportunity to trick Applesoft by letting it think it is running a program, whereas in fact the execution mode is immediate. On executing the GOSUB statement, Applesoft's GOSUB handler saves on the stack (among others) the text-pointer, which points at that time to the first digit of the line number following the GOSUB. Next, the GOSUB handler transfers control to the GOTO handler, which subsequently converts the line number to hex, searches for the line number in the program, saves it in the current line number location and starts execution of the specified line.

Note that now the high byte of the current line number does not contain $FF anymore, so Applesoft will from now on think it is running a program. Therefore, Applesoft doesn't generate an ILLEGAL DIRECT ERROR on encountering the INPUT A$ statement (which would be the right thing to do), but executes the statement instead.

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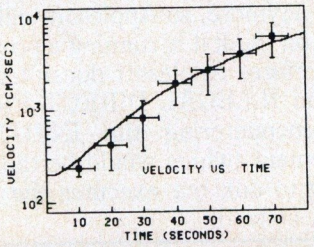
Unlike most other plotting systems for the Apple II which are stand-alone systems, the AMPERGRAPH utility provides extended BASIC graphics language macros that you can use directly in your own Applesoft programs. The additional commands are &SCALE, &LIMIT, &AXES, &GRID, &FRAME, &LOG X, &LOG Y, &LABEL AXES, &LABEL, &VLABEL, &CENTER LABEL, &CENTER VLABEL, &DRAW, &PENUP, &CROSS, &OPEN SQUARE, &CLOSED SQUARE, &OPEN CIRCLE, &CLOSED CIRCLE, &ERROR BARS, &DUMP (to dump the graph on a Silentype printer) and &*DUMP (to link with AMPERDUMP, see below).

AMPERGRAPH uses the Applesoft ampersand machine language jump vector to link to a relocatable 9K routine which normally resides above the second page of high-resolution graphics in the Apple II Plus.

SAMPLE AMPERGRAPH PROGRAM LISTING:

```
10 &SCALE, 0, 80, 80, 13000
15 LX$ = "TIME (SECONDS)":LY$ = "VELOCITY
   (CM/SEC)"
20 &LOG Y:&LABEL AXES, 10, 10
25 LABEL$ = "VELOCITY VS. TIME":&LABEL, 30,
   200
30 FOR T = 0 TO 80:&DRAW, T, 150 + T12:NEXT T
35 FOR T = 10 TO 70 STEP 10
40 &CLOSED SQUARE, T,
   (150 + T12)*(.8 + .4*RND(3) )
45 &ERROR BARS, 5, T12/2
50 NEXT T:&DUMP
```



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AMPERGRAPH and AMPERDUMP are available from your dealer for $30.00 each, or order direct. Include $1.50 for shipping and handling; Wisconsin residents add 4% sales tax.

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UNRAVELING A PUZZLE

It will be clear that by entering a long string, problems will arise, for sooner or later, Applesoft will encounter a RETURN statement which transfers control back to the instructions that are stored in the input buffer. As Applesoft will find there the inputted character string rather than the tokenized BASIC instructions, a crash will usually occur.

The reason the program above doesn't crash is that Applesoft is tricked once again, whereby use is made of the fact that Applesoft stores a zero in the input buffer *at the end of each input line.*

If program line 100 has been entered, the exact contents of the input buffer are as displayed in column 2 of figure 1. As can be seen, Applesoft has stored a zero at $21A and $21C. These zeros indicate that execution must be terminated since the end of the instruction sequence is reached.

When executing GOSUB5[return], Applesoft saves on the stack the value $201, being the current value of the textpointer. Next, the INPUT A$ statement is executed and the result is that the inputted text ERR is stored at $200 and a zero, indicating the end of text at $203 (see column 4). Then Applesoft encounters the RETURN, and so pulls Textpointer from the stack again. The RETURN handler searches for the next end of statement symbol which is a colon or a (hex) zero. (Note that the RETURN handler doesn't check the characters following the GOSUB token, so statements like: 100 GOSUB 1000 without a colon or 100 GOSUB 1000/3 will also be accepted and executed by Applesoft).

Because the restored textpointer equals $201 and location $203 contains a zero, Applesoft will think that the end of the line is at $203. To check whether the program is finished, Applesoft compares the byte stored in $205 with zero. Since $205 contains the value 53, execution is continued. However, as Applesoft still thinks it is running a program, it will treat the bytes at $204 and $205 as the pointer to the next line and the bytes at $206 and $207 as the (new) current line number. The instruction starting at $208 is then executed. Since this instruction corresponds to the last part of line 100 previously entered and still present in the input buffer, Applesoft kindly prints "APPLESOFT ERROR" before control is returned to the user.

Figure 1 Contents of the input buffer after the different inputs

input buffer location	(1) "after" line 5	(2) "after" line 100	(3) "after" GOSUB5	(4) "after" INPUT A$
$200	INPUT	TEXT	GOSUB	E
$201	A	:	5	R
$202	$	HOME	0 (EOL)	R
$203	:	:	85 (U)	0 (EOT)
$204	RETURN	VTAB	0 (EOP)	0
$205	0 (EOL)	1	53 (5)	53 (5)
$206	—	0	0 (EOT)	0
$207	0 (EOP)	:	:	:
$208	—	PRINT	PRINT	PRINT
$209	—	"	"	"
$20A	—	<-- APPLESOFT ERROR-->		
$219	—	"	"	"
$21A	—	0 (EOL)	0 (EOL)	0 (EOL)
$21B	—	—	—	—
$21C	—	0 (EOP)	0 (EOP)	0 (EOP)

Explanation:
EOT: End Of Text
EOL: End Of Line
EOP: End Of Program

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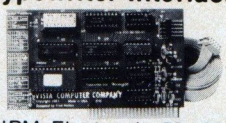

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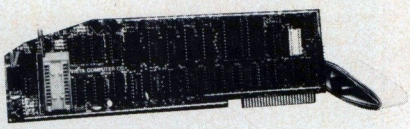

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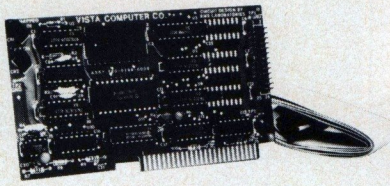

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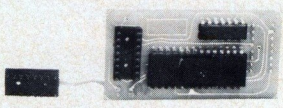

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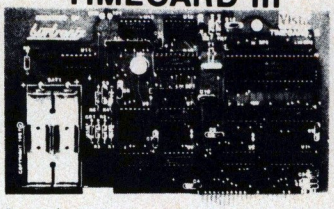

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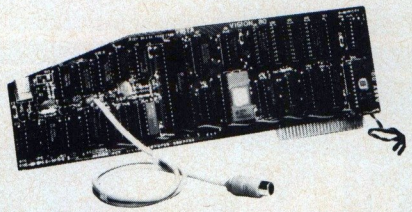

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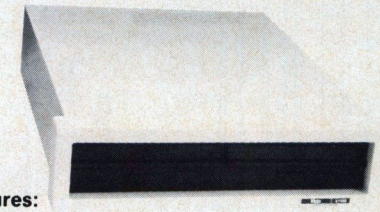

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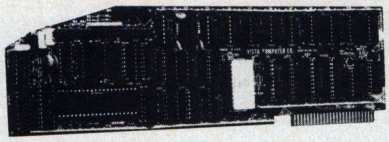

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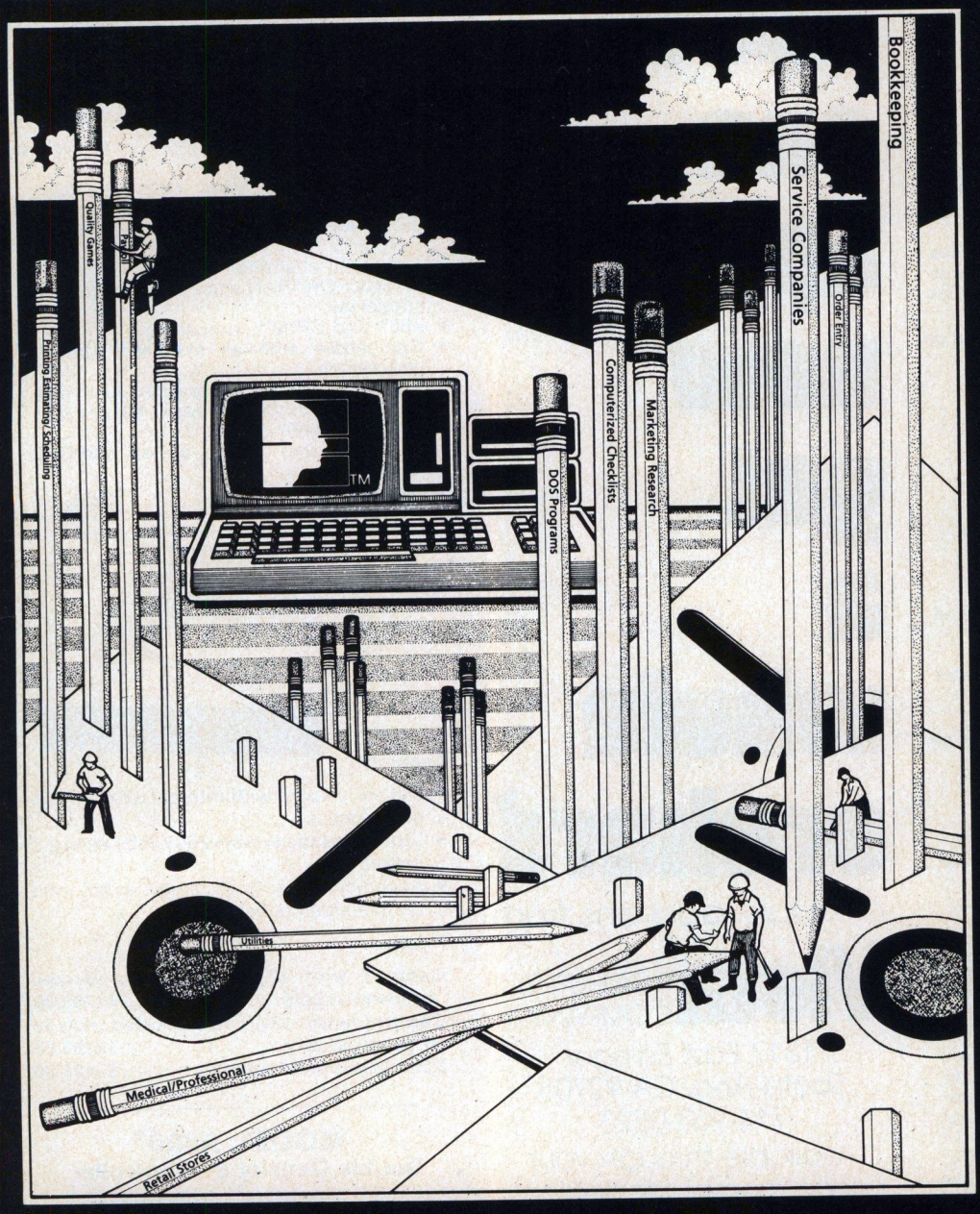

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PATCHING DOS THE EASY WAY

Leighton Paul

MANY Apple users like to customize their DOS a little bit, adding patches published in *Call —A.P.P.L.E.* and other sources. For example, patches to DOS have been published to allow direct keyboard typing of the textfile commands OPEN, WRITE, and CLOSE. Other patches prevent automatic reloading of the language card on bootup, and things like making the greeting program a binary file or EXEC file.

Making a patch to DOS that is permanent has usually involved several steps:

Because changing the image of DOS that exists in RAM memory is effective only until the next bootup, this means that the image of DOS stored on tracks 0–2 of the diskette must be changed. The first step involved finding the place in RAM memory where the patch was to reside.

The next step involved using a disk utility program to read individual tracks and sectors of tracks 0 – 2 on the diskette to find where the same code resides on the disk.

The final steps were to use the disk utility program to change the necessary bytes on the disk, then boot up with it and try the patches out.

The following short program is a utility to greatly speed the patching process. It also allows the user to change the name of the program that is automatically run on bootup. Written for a 48K system, it uses the DOS file manager to store the RAM image of DOS back to the disk, the same way that the INIT command does, but without reformatting the disk, or erasing any files.

To make patches to DOS on a disk, all the user needs to do is LOAD DOS UPDATE, make the desired patches in the RAM image of DOS, then type RUN from BASIC.

Here is an example of how to patch DOS to avoid reloading the language card on bootup:

```
]LOAD DOS UPDATE
]CALL-151
*BFD3:EA EA EA
*3D0G
]RUN
```

After typing RUN, the program will ask for the name of the greeting program to be stored in the DOS image. If it is HELLO, just type HELLO, and hit return. The DOS on the disk will then be updated.

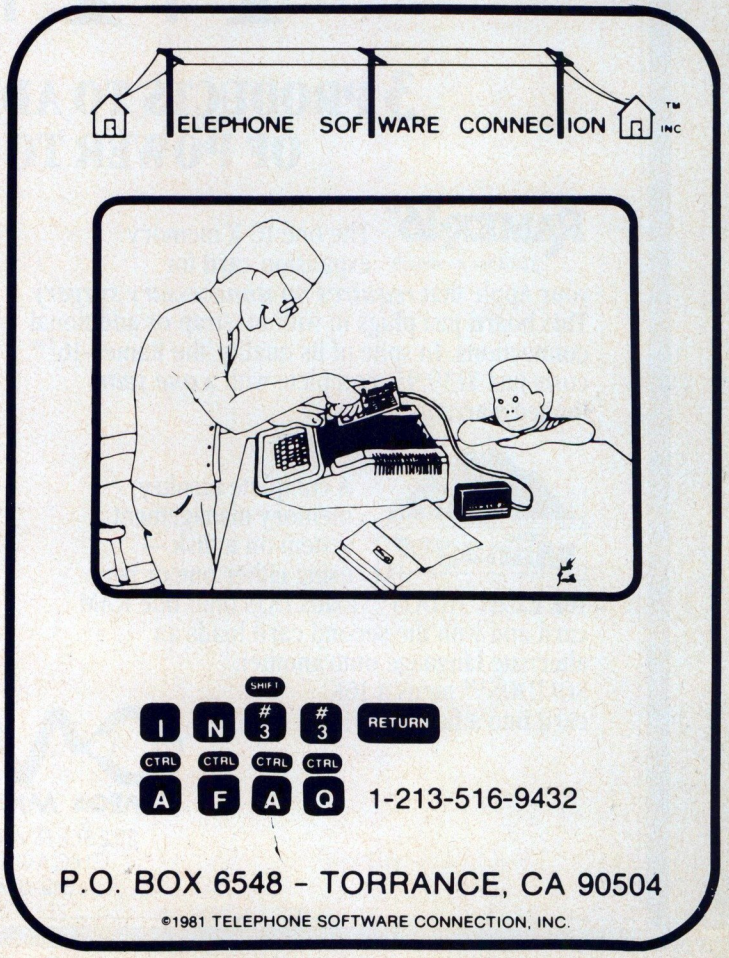
The program should be run *only* on standard DOS 3.3 disks originally formatted with the INIT command. It should never be used on a copy-protected disk containing non-standard DOS.

This same program is also available, already typed and tested, for FREE by calling Telephone Software Connection's 24–hour MODEM number (213) 516–9432.

```
]LIST
10  REM
 DOS UPDATE  BY LEIGHTON PAUL
CALL  - A.P.P.L.E. : JULY 1982
(48K APPLE ][ ONLY)

40   FOR I = 32768 TO 32822: READ
      A: POKE I,A: NEXT
50   PRINT "ENTER THE NAME OF THE
      GREETING PROGRAM"
55   PRINT "TO BE RUN AUTOMATICALL
      Y UPON BOOTING UP:"
60   PRINT : INPUT "FILENAME: ";F$

70   IF  NOT  LEN (F$) THEN 60
80 T =  ASC ( LEFT$ (F$,1)): IF T
      < 64 OR T > 90 THEN  PRINT
     : PRINT "ILLEGAL FILENAME!":
      GOTO 60
90   POKE 32792, LEN (F$) - 1
100   FOR I = 32823 TO 32823 +  LEN
      (F$) - 1: POKE I, ASC ( MID$
      (F$,I - 32822,1)) + 128: NEXT
     : REM  STORE FILENAME
110   CALL 32768: REM   STORE DOS
      ON DISK
2000   DATA 186,142,155,179,162,15
      ,189,37,128,157,187,181,202,
      16,247,169,0,141,95,170,32,1
      49,160,160,4,185,55,128,153,
      117,170,136,16,247,76,255,17
      4,11,157,1,0,254,1,15,0,117,
      170,0,0,0,152,0,151,0,150
```

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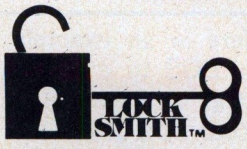

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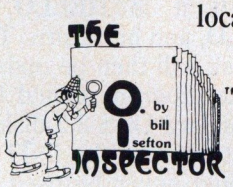

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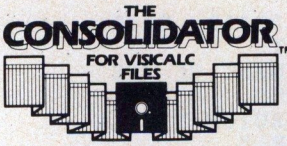

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CALL —A.P.P.L.E. TECHNIQUE:

IMBEDDING MACHINE CODE IN APPLESOFT PROGRAM FILES

William J. Cheeseman

THERE are at least four techniques commonly in use to "imbed" machine code routines in an Applesoft program file: (1) Linear POKEing, (2) READing a DATA statement and POKEing in a loop, (3) the S.H. Lam string method, and (4) the "transparent" method of inserting machine code in an artificial gap created between the end of the program and the end of program pointer. See *"All About Applesoft," Call –A.P.P.L.E. In Depth No. 1, pp.29–30.*

While in a sense the seed of the machine code routine resides in the Applesoft program, these four techniques have in common the feature that the final machine code resides at some location outside of the Applesoft program itself. The first three allow selection of any unused memory location, such as page 3. The last requires that the machine code, generated independently, appear immediately following the Applesoft program in memory. In none of them is the Applesoft program modified in any way, but instead continues to reside in memory in its original form. The machine code is not really "imbedded" in the Applesoft program.

Each of these techniques has some disadvantages. The first three waste memory, in the sense that the Applesoft routines which generate the machine code normally remain in memory, unused, after they have completed their task of loading the machine code. Furthermore, if you want to use a lot of small code routines, appropriate locations can soon be in short supply. The "transparent" method does not suffer from these shortcomings, but it is singularly uninformative to anyone examining the Applesoft listing — there is no hint that machine code lurks in the file. Also, if editing of the Applesoft program is contemplated, relocatable machine code must be used. The machine code must be generated by an assembler or some other device extrinsic to the Applesoft program.

This article discusses a modification of the DATA statement READ/POKE approach, which overcomes these disadvantages. It is based on the realization that a READ/POKE loop may be allowed to overwrite the DATA statement and related routines without interrupting execution of the generating loop. Thus, the DATA statement itself, which is used only once, *can become the final location of the machine code routine.* There will always be enough room, because each element of the DATA statement occupies at least two bytes (a digit and a comma), but generates only one byte of machine code. In this manner, the Applesoft program can be loaded and listed to reveal the machine code generating routines, but no space is wasted when the machine code they generate is POKEd into the midst of the Applesoft program file. This makes available a virtually unlimited number of memory locations for short, relocatable machine code routines, which do not interfere with use of page three and other desirable scratch areas. Furthermore, if the machine code is POKEd into the beginning of the Applesoft program at $801, nonrelocatable code can be used.

This technique is possible because the READing of DATA statements is controlled by a zero page pointer which references absolute memory locations, automatically incrementing as each DATA element is READ. Once the pointer has found the DATA token and moved beyond it, the DATA token and following elements can be overwritten without interrupting the functioning of the pointer. The pointer always stays ahead of the POKEd machine code.

All of the examples listed and discussed below create a trivial machine code routine for demonstration purposes: JSR $DB5A, JMP $D7D2. When CALLed by the program, it executes an Applesoft internal routine which prints a question mark to the screen, then calls a routine which continues execution of the next Applesoft statement.

1) At the Beginning

The first example, Listing #1, generates the machine code at the beginning of the Applesoft program, then raises the start of program pointer over it. This has the apparent effect of "deleting" the first few Applesoft lines, which will be modified as machine code is POKEd into them. No effort to preserve the integrity of line numbers and line number pointers in this pre-empted area is needed, because Applesoft line searches will always start with the raised start of program pointer. Subsequent program listings will not show the modified area, which will appear to have disappeared (much like the "transparent" method).

Raising the start of program pointer over an area at the beginning of the program is not new. See "Pointers on Pointers", *Call –A.P.P.L.E. vol. V, no. 1, p. 75.* However, I have introduced one refinement which not only buries the unneeded lines, but also buries the undertaker, so to speak. Line 30 of Listing #1 uses the OLDTXT pointer at $79, $7A (dec 121, 122) to locate the pointer to the next line, POKEs the latter pointer directly into the start of program pointer, TXTTAB, at $67, $68 (dec 103, 104). Thus, subsequent listings will show the program as beginning at the next line, line 40. Lines 1 through 30 will have disappeared from view. This is cleaner than the method described in "Pointers on Pointers", which left the "undertaker" line visible as the first line of the modified program. In addition, it avoids an apparent bug which may cause the "Pointers on Pointers" technique to fail on page boundaries.

IMBEDDING CODE IN APPLESOFT FILES

Placing the machine code at the beginning of the program has the advantage of allowing use of nonrelocatable code, since the code will always start at $800 (assuming the Applesoft program is loaded at the normal location). CALL 2048 will always execute the machine language routine. In addition, this is at the beginning of a page of memory. With careful counting of bytes, additional nonrelocatable routines can be stacked up in this area. The self-modified Applesoft program can be rerun without reloading as often as desired — the machine code need not be regenerated because it is already there from the first run. Note that the start of program pointer and the null byte at $800 should normally be reset before loading another program — either by POKEing from an exit routine in your program, POKEing manually, typing "FP," or rebooting. However, if you wish to use the same machine code routines with the next program, you can simply load it without resetting the pointer.

This same technique should work with the S.H. Lam string method as well, since the real string is usually in high string memory space by the time the POKE loop begins to overwrite the program line which creates the string variable assignment.

2) Scattered Hither and Yon

Alternatively, the machine code routines and their generating DATA statement READ/POKE loops can be scattered throughout your Applesoft program. This requires a little more overhead, but may be useful in complex programs. It has the advantage of leaving the start of program pointer in its normal location. However, under most circumstances, relocatable code must be used, and the location of the code must be calculated and preserved in a variable so it can be CALLed later. Because this variable would be cleared, the program cannot be rerun unless it is first reloaded. (The value of the variable, however, may be preserved by POKEing the high and low bytes into an unused zero page location and subsequently restoring the variable in a second program with PEEKs.)

The "before" version of Listing #2 demonstrates the technique. Line 30 is the key. (Lines 10 and 110 could just as easily have been incorporated directly into line 30, but they should be subroutines if you have more than one machine code routine to generate.) Line 30 uses FN ADR(121) to calculate the address of the null byte at the end of the prior program line, using the pointer OLDTXT at $79, $7A (dec 121, 122). An offset (in this example, 9) is added to place the beginning of the machine code routine, A, well into the line (for reasons to be described). The programmer must supply the correct offset, as well as the length, L, of the machine code routine, which is needed to control the READ/POKE loop. Note that variables A and L will have the correct values to be used with BSAVE and other DOS file commands. In addition, the programmer must supply the proper negative offset in line 110 (in this case, -4).

Because of the way Applesoft executes, it is necessary to provide a means for the program to bypass the machine code after it has been generated, before the program circles back to re-execute this section. (If this section will not be executed again, the remainder of this discussion can be ignored and the housekeeping routines can be omitted.) The problem is this: Once the machine code has been generated, on a subsequent pass through this section, the program would try to interpret it as Applesoft statements and generate a syntax or logic error.

Three solutions are possible. One is to POKE the Applesoft token for REM (178) into the first byte of the line. Then subsequent passes will ignore the rest of the line, thinking it is a comment. This method does work; it obviates the need to calculate offsets; and it is shorter. However, I dislike the approach. For one thing, a listing of the program after execution is unsightly, since the machine code bytes are printed as a "comment" after the REM. They appear as a combination of garbage and the unmodified balance of the Applesoft statements. Worse, the machine code is expanded in the listing because it is interpreted as if it were Applesoft tokens, and the resulting line might be longer than the maximum permissible Applesoft line.

A better approach (or at least more pleasing) is to POKE a GOTO statement aimed at the next line, so the rest of the line will simply be bypassed on subsequent passes. It is easy enough to POKE the GOTO token (171) and a null byte (0) or ASCII colon (58) signalling the end of the statement, but how to generate the right line number? This can be done with Applesoft routines, but the overhead is extensive. The gimmick used here is to start the line with the statement "IF [next line number] THEN . . ." Thus the GOTO token can be POKEd over the IF token, and the null byte or colon can be POKEd over the THEN token. The correct line number remains in place, as supplied originally by the programmer. Applesoft treats any positive integer as a Boolean "true" value, so the IF . . . THEN statement will cause the rest of the line to be executed the first time through. On the second pass, it will have become a GOTO . . . , which will bypass the (now modified) remainder of the line.

This leaves one task, to accommodate line numbers of differing lengths. The proper offsets must be supplied by the programmer, as described above. Bearing in mind that the defined FN ADR (121) returns the memory location of the last byte of the prior line, the locations of the needed POKEs can be counted on this basis: add four bytes for the program line number and the pointer to the next line, add one byte for the IF token, add one byte for each digit in the next line number, add one byte for the THEN token, and add one byte to get to "A", where the machine code starts. The negative offset in line 110 is obtained by counting backwards from "A" to the IF token, where a GOTO token will be POKEd.

POKEing a null byte in place of the THEN token fools the Applesoft listing routine into believing it is the end of the line. Thus, listing the program after it has been run hides the machine code. See the "after execution" version of Listing #2. If the colon (ASCII 58) were used, the technique would still work but the machine code would list as garbage, just as it does if REM is used.

You can see that the machine code is present by editing, adding or deleting a line in the program after it is run once, then listing it again.

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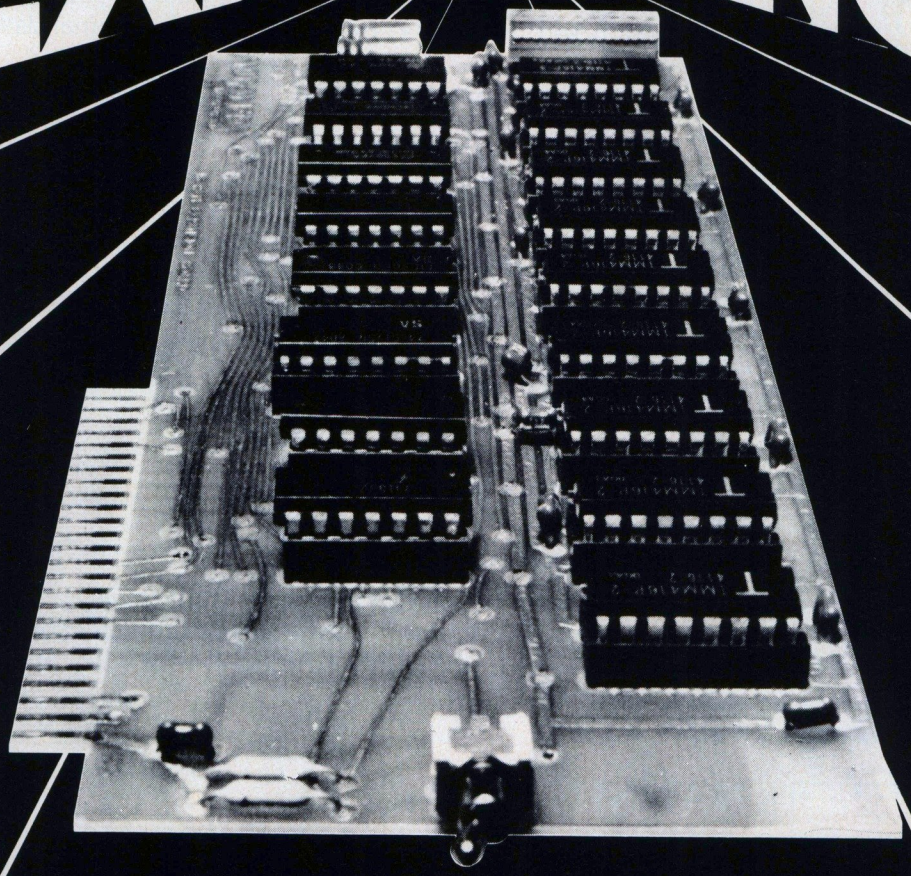

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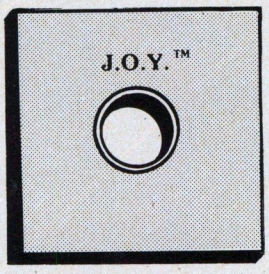

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IMBEDDING CODE IN APPLESOFT FILES

This regenerates the linked list of line pointers, and Applesoft interprets the first few bytes of machine code as a line number. See line 19675 of the "after editing" version of Listing #2. For this reason, it is important to be careful while developing or editing any program which uses these tricks. It can be helpful to insert a REM at the beginning of the line during development, to prevent it from executing.

Finally, if the machine code generator is placed in a subroutine, the IF...THEN gimmick and all of these offset calculations can be avoided. Merely POKE a RETURN token into the first byte of the line and a null into the second byte, and POKE the machine code starting with the third byte. Then on subsequent passes the call to this subroutine will simply return without doing anything. See Listing #3.

Note that the S.H. Lam string technique cannot conveniently be used in this "hither and yon" fashion, since you normally will not know what starting memory location to specify. If you are willing to calculate the memory location once editing has been completed, however, it should work.

```
]LIST

1  REM

LISTING 1
10  DATA  32,90,219,76,210,215
20  FOR I = 2048 TO 2053: READ B:
      POKE I,B: NEXT
30 PTR =  PEEK (121) +  PEEK (122
    ) * 256 + 1: POKE 103, PEEK
    (PTR): POKE 104, PEEK (PTR +
    1)
40  REM

[THE REST OF YOUR PROGRAM]

50  CALL 2048
60  PRINT : PRINT "THE TEST WORKE
    D IF YOU SEE A '?'
70  END
```

```
]LIST

1  REM

LISTING #2 (BEFORE)

*** READ POINTER FUNCTION ***
10  DEF  FN ADR(X) =  PEEK (X) +
      PEEK (X + 1) * 256
20  REM

[THIS IS A CHUNK OF YOUR PROGRAM]

30  IF 40 THEN A =  FN ADR(121) +
    9:L = 6: DATA  32,90,219,76,
    210,215: GOSUB 110: REM  (TH
    IS LINE WILL BE MODIFIED)
40  PRINT "A = "A", L = "L: CALL
    A
50  PRINT : PRINT "THE TEST WAS S
    UCCESSFUL IF YOU SEE A '?'"
60  REM

[THIS IS MORE OF YOUR PROGRAM]

70  END : REM

*** CODE POKER SUBROUTINE ***
110  FOR I = A TO A + L - 1: READ
     B:POKEI,B: NEXT : POKE A - 4
     ,171: POKE A - 1,0: RETURN
```

```
]LIST
LISTING #2 (AFTER EXECUTION)
*** READ POINTER FUNCTION ***
10  DEF  FN ADR(X) =  PEEK (X) +
      PEEK (X + 1) * 256
20  REM

[THIS IS A CHUNK OF YOUR PROGRAM]

30  GOTO 40
40  PRINT "A = "A", L ="L: CALL A

50  PRINT : PRINT "THE TEST WAS S
    UCCESSFUL IF YOU SEE A '?'"
60  REM

[THIS IS MORE OF YOUR PROGRAM]
70  END : REM

*** CODEPOKER SUBROUTINE ***
110  FOR I = A TO A + L - 1: READ
     B: POKE I,B: NEXT : POKE A -
     4,171: POKE A - 1,0: RETURN
```

```
]LIST

1  REM

LISTING #2 (AFTER MORE EDITING)

*** READ POINTER FUNCTION ***
10  DEF  FN ADR(X) =  PEEK (X) +
      PEEK (X + 1) * 256
20  REM

[THIS IS A CHUNK OF YOUR PROGRAM]

30  GOTO 40

19675 SGN  SCRN( (121) + 9:L = 6:
      DATA  32,90,219,76,210,215:
      GOSUB 110: REM  (THIS LINE
     WILL BE MODIFIED)
40  PRINT "A = "A", L = "L: CALL
    A
50  PRINT : PRINT "THE TEST WAS S
    UCCESSFUL IF YOU SEE A '?'"
60  REM

[THIS IS MORE OF YOUR PROGRAM]
70  END : REM

*** CODEPOKER SUBROUTINE ***
110  FOR I = A TO A + L - 1: READ
     B: POKE I,B: NEXT : POKE A -
     4,171: POKE A - 1,0: RETURN
```

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```
]LIST

1  REM

LISTING #3

*** READ POINTER FUNCTION ***
10  DEF  FN ADR(X) =  PEEK (X) +
     PEEK (X + 1) * 256
20  REM

[THIS IS A CHUNK OF YOUR PROGRAM]

30  GOSUB 90
40  PRINT "A = "A", L = "L: CALL
    A
50  PRINT : PRINT "THE TEST WAS S
    UCCESSFUL IF YOU SEE A '?'"
60  REM

[THIS IS MORE OF YOUR PROGRAM]
80  END : REM

*** 'UNDERTAKER' SUBROUTINE ***
90 A =  FN ADR(121) + 7:L = 6: DATA
      32,90,219,76,210,215: GOSUB
     110: RETURN : REM  (THIS LIN
     E WILL BE MODIFIED)
100  REM

*** CODEPOKER SUBROUTINE ***
110  FOR I = A TO A + L - 1: READ
     B: POKE I,B: NEXT : POKE A -
     2,177: POKE A - 1,0: RETURN
```


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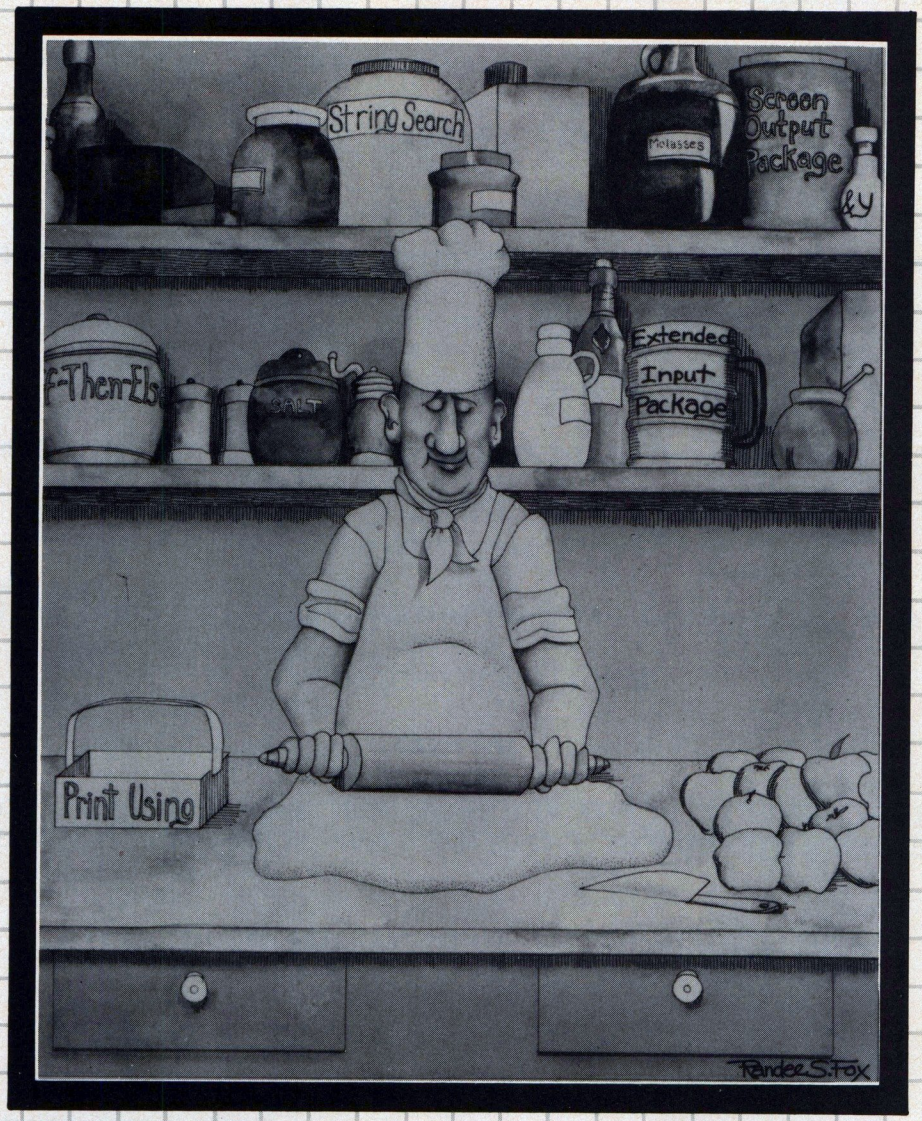

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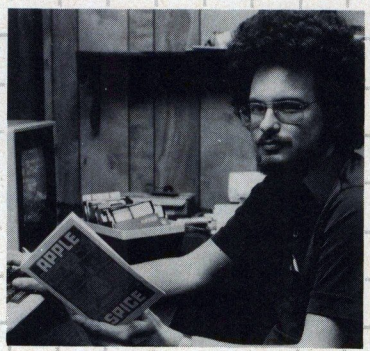

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DYNAMIC LOADING AND LINKING

John L. Shanks

THERE are a number of ways to link machine code to Applesoft Basic programs, and some of these were discussed in the June, 1979 issue of *Call –A.P.P.L.E.* ("Hiding Out in Basic," by Val J. Golding, p. 5, and "The Basic–6502 Linker," by Andy Hertzfield, p. 7). In particular, I would like to present an extension of the technique of appending machine code to the top of the Applesoft program. This is also called the "transparent" method, and is further discussed by Val Golding in *Call –A.P.P.L.E. in Depth,* no. 1, pg. 30, as well as William Cheeseman in this issue.

By putting the machine code on top of the BASIC, and then changing the various "top–of–program" and "beginning–of–variables" pointers, the machine code becomes a part of the BASIC. Hence, the machine code is saved and loaded with the BASIC. Also, the BASIC editor will automatically move the machine code up and down in memory when changes are made to the BASIC statements. This points out one problem with this technique. The machine language code must be relocatable, since you have no control over where it is loaded, and it may be moved after it is loaded. However, there are coding techniques to overcome this restriction, and I believe the procedure is quite useful.

The extensions in this article allow you to load and link any number of machine code files to an Applesoft program. Each file may have any number of entry points, or other locations which must be accessed from BASIC. Since the linking is dynamic and occurs at the time the BASIC program is run, the entry points are picked up automatically. Also, the machine code may be maintained separately from the BASIC code, and no changes are required to be made in the BASIC code when updated machine code files are loaded. Furthermore, the machine code files may be either executable code or data files, such as "shape tables."

The code used in this procedure consists of a short *loader* program, written in BASIC, which may be embedded in the BASIC code, a *linker* routine which is run as a part of the initialization of the BASIC program, and a machine code *preamble* which is appended to each machine code file to be loaded.

This procedure hinges on the one-line BASIC subroutine,

```
63999 F1 = PEEK(121) + 256
      *PEEK(122) + 34: RETURN;
```

which is a slight modification of the code presented by Mark Cross in his article "Appending Machine Language to BASIC," p.60 of the June, 1981 issue of *Call –A.P.P.L.E.* This must be the last statement of the program, as it is used to find the first available free memory location after the last BASIC statement. F1 is the location at which we wish to load our first machine code file.

Preamble

It is desirable to be able to load a number of machine code files, with the first being loaded at the address F1 found by subroutine 63999. The second one, of course, should be loaded right above the first, and the third right above that, and so on, so we need to know the length of each file loaded. Also, this information has to be available to the running program so it knows where to link into the machine code. For this purpose, I propose to use a machine code routine at the beginning of each file, the "preamble" mentioned above. The purpose of the preamble is twofold; first, to move the end-of-program and beginning-of-variable pointers from the beginning of the machine code file to the end of the machine code file, and secondly, to provide locations where the BASIC program can find the information it needs to access the machine code.

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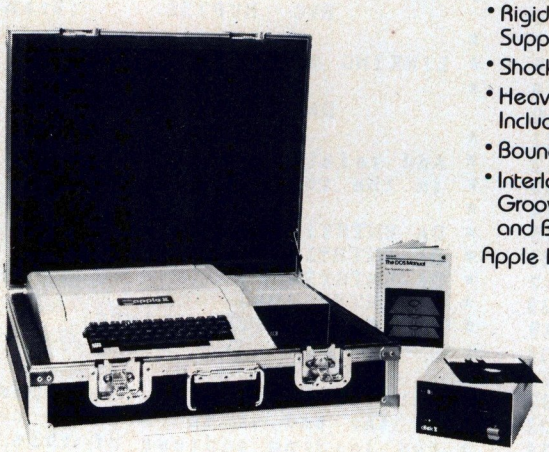

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DYNAMIC LOADING AND LINKING

Listing A shows the preamble. The MVPTRS routine fetches the end-of-program address from the EOP location, adds the length of the machine code, and stores the result in the locations EOP, SVSTRT, ARSTRT, AND ENSTOR. These locations may be found in several references, including *Call -A.P.P.L.E. in Depth,* referenced above, and the publication *What's Where in the Apple*, by W. F. Luebbert. Each machine code file should contain this code. The operational code should be inserted between the MVPTRS routine and the FILEND = * statement. With the Big Mac Assembler, it is a simple matter to append the operational source code to the preamble, and move the FILEND = * statement to the end of the program.

One other change is required in the assembler program. Following the DA = FILEND —ORG should be a list of entry points for that file in the form

DA ENTRY1 — ORG
DA ENTRY2 — ORG
DA ENTRY3 — ORG, etc.

These are the addresses of all the entry points in this file, relative to the origin, or load point of the file. There may be up to sixty-two of these entry point addresses in the table, but the first item in the table must be DA = FILEND — ORG.

LOADER

Given that every file to be loaded now contains the preamble code, we can now design the loader. An example of a loader is shown in lines 63990-63993 of Listing B. In this example, four machine code files are being loaded. Since we want the first file to be loaded at the address right above the last BASIC statement, the first statement executes a "GOSUB 63999," which sets F1 equal to that location. Next, since we know that the preamble requires that the "top-of-program" pointer contain that same address, it is POKEd into locations 175 and 176. Then the first file is "BLOADed" from the disk to that location. Instead of the "file 1 name", use the actual name of the machine code as it is saved on disk.

Now that the file is loaded, it is necessary to move the program pointers. This is done by the machine code preamble which is CALLed at location F1. However, the variable F1 has been destroyed by BLOADing the machine code file, so it is necessary to pick up that address by CALLing the value previously saved at locations 175 and 176.

If there were only one file to load, this would be the only statement required in the loader. Statement 63991 shows how the next file is loaded. Since the CALL to the preamble moves the pointers to the top of the first file, it is sufficient to simply BLOAD the second file to the address now contained in locations 175 and 176. A CALL to that address executes the preamble in the second file and moves all the required BASIC pointers. This continues for all the machine code files which need to be loaded.

```
ASM
                        1   *
                        2   *      *** LISTING A ***
                        3   *
                        4   * PREAMBLE FOR LOADING AND LINKING
                        5   * MACHINE CODE TO BASIC
                        6   *
                        7   *
                        8   SVSTRT   =    $69
                        9   ARSTRT   =    $6B
                       10   ENSTOR   =    $6D
                       11   EOP      =    $AF
                       12   *
                       13   ORG      =    *
                       14   *
8000: B8               15   START    CLV              ;Reset the V bit
8001: 50 02            16            BVC  MVPTRS      ;Branch always
                       17   *
                       18   * LINKING ADDRESSSES TABLE
                       19   *
8003: 1F 00            20            DA   PRGEND-ORG
                       21   *
                       22   * Add relative addresses of entry points here
                       23   * in the following format
                       24   *
                       25   * DA ENTRY1-ORG
                       26   * DA ENTRY2-ORG
                       27   * DA ENTRY3-ORG
                       28   * DA ENTRY4-ORG
                       29   * (UP TO 62 ENTRY POINTS)
                       30   *
                       31   *
                       32   * This routine moves the Applesoft program pointers
                       33   * to the end of the machine code. It assumes that
                       34   * the loading address of this file is available in the
                       35   * End-Of-Program (EOP) location
                       36   *
                       37   *
8005: A5 AF            38   MVPTRS   LDA  EOP         ;Get the machine code starting LOC
8007: 18               39            CLC              ;as loaded by BASIC
```

```
8008:  69  1F     40                ADC  #<PRGEND-ORG ;add the code length
800A:  85  AF     41                STA  EOP         ;put in Applesoft EOP location,
800C:  85  69     42                STA  SVSTRT      ;simple variable start address,
800E:  85  6B     43                STA  ARSTRT      ;array space start address, and
8010:  85  6D     44                STA  ENSTOR      ;end of numeric storage address.
                  45  *
8012:  A5  B0     46                LDA  EOP+1       ;Get the Hi byte
8014:  69  00     47                ADC  #>PRGEND-ORG ;add the Hi byte
8016:  85  B0     48                STA  EOP+1       ;and save it
8018:  85  6A     49                STA  SVSTRT+1
801A:  85  6C     50                STA  ARSTRT+1
801C:  85  6E     51                STA  ENSTOR+1
801E:  60         52                RTS              ;Return to calling program
                  53  *
                  54  * The operational user code goes here
                  55  *
                  56  *ENTRY1 XXX XXXX
                  57  *        ...
                  58  *        ...
                  59  *        RTS
                  60  *
                  61  *ENTRY2 XXX XXXX
                  62  *        ...
                  63  *        ...
                  64  *        RTS
                  65  *
                  66  *ENTRY3 XXX XXXX
                  67  *        ...
                  68  *        ...
                  69  *        RTS
                  70  *
                  71  *ENTRY4 XXX XXXX
                  72  *        ...
                  73  *        ...
                  74  *        RTS
                  75  *
                  76  *
                  77  PRGEND   =    *
```


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DYNAMIC LOADING AND LINKING

It is important to note that the loader is terminated by an "END" statement. The loader is a stand-alone program. It is only run to initially load the machine code files on top of the BASIC code. Thereafter, the BASIC may be saved, loaded, changed, etc., and the machine code files will still be a part of the program. The loader need be run again only if there has been some change in the machine code, or if for some reason the machine code section of the BASIC program gets clobbered. If no such occurrences are anticipated, the loader code may be deleted from the program after the machine code files have been loaded.

LINKER

The linker code is a part of the BASIC program and must be run somewhere in the program before the machine code is required by the BASIC. Listing B also shows an example of a linker.

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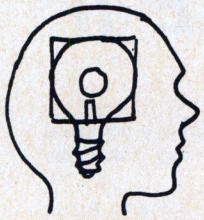

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The statement at 10000 just defines a double word PEEK function to cut down on having to type so many asterisks and parentheses. At 10010, the GOSUB 63999 finds the beginning of the first machine file, which was loaded there by the loader. To find the beginning of the second file, we need to know the length of the first file. Recall that this information is the first item of the address table of the preamble of machine File 1. We know where that is. It must be three locations up from the beginning of File 1. Therefore, by PEEKing at the double word at F1+3, we get the length of File 1. Hence, the address of the second file can be obtained from

```
F2 = F1 + FN PK(F1+3)
```

Thus we continue to find the beginning of each of the machine code files which were loaded by the loader.

After finding the beginning of each file, we need to know the location of the various entry points in each of the files. As an example, it was assumed that File 1 had two entry points, File 2 had four entry points, and both Files 3 and 4 each had only one entry point. Lines 10050-10120 show how these addresses are obtained.

We will assume that the entry points are listed in the linking address table in ascending order, as shown in Listing A. Each address requires two bytes, so the relative address of Entry1 of File 1 will be found at F1+5, Entry2 at F1+7, etc. Lines 10050–10060 pick up the two entry points in the machine File 1.

As we indicated above, File 2 has four entry points, and line 10070-10100 get the addresses of those. These are all entry points in machine code File 2, so the base address is F2 now instead of F1. Lines 10110 and 10120 get the single entry points for files 3 and 4.

Listing B illustrates a particular example, but in general, if FS(J) indicates the starting address of machine File J, and EP(I,J) indicates the Ith entry point of File J, then the following equations hold:

```
FS(1) = F1 (From GOSUB 63999)
FS(J+1) = FS(J) + FN PK(FS(J)
+ 3), FOR J = 1,2,3,...,
EP(I,J) = FS(J) + FN PK(FS(J) +
3 + 2*I).
```

Finally, there are extensions to this procedure which could be considered. For example, the loader could be made into an EXEC, rather than put right into the program. Also, if sufficient memory space is saved above the BASIC program, dynamic loading could be used by loading in only those machine code files which are needed, at the time they are called by the BASIC code.

SUMMARY

The procedure presented here provides a general approach to loading and linking machine code to Applesoft. It tends to modularize the program development, so that the BASIC programmer does not need to become directly involved in the machine code development. He only needs to know the names of the machine code files, and the order in which the entry points are listed in the address linking tables. On the other hand, the machine coder can develop and maintain the assembler programs without too much concern about impact on the BASIC program (unless functional specificatons change). The new machine code, after being loaded by the special loader, is automatically linked when the BASIC program is run. The complete program can be saved and used until new machine code needs to be loaded.

To implement the system, the BASIC programmer needs to add the line 63999 to the end of his program, and write the loader and linker for his application. The machine coder needs to append the preamble code to each of his files, making sure the FILEND = * statement is at the end of each, and that all the entry points are entered into the address linking tables.

The following steps will put the loader and linker into operation:

1. Load the BASIC program.
2. Insert the disk containing all the machine code files to be loaded.
3. Run the loader program in the BASIC code.

Now the program can be run, saved, loaded, and/or changed, without any further need to run the loader.

LISTING B

```
10  REM

LOAD AND LINKER SUBROUTINES
Appending machine files to FP

      by  John L. Shanks
Call -A.P.P.L.E. : July 1982

9999  REM

LINKER SUBROUTINE

To be run as part of the
program initialization

10000  DEF  FN (PK)X =  PEEK (X) +
     256 *  PEEK (X + 1): REM "

Find the starting addresses for
each machine file

10010  GOSUB 63999
10020 F2 = F1 +  FN PK(F1 + 3)
10030 F3 = F2 +  FN PK(F2 + 3)
10040 F4 = F3 +  FN PK(F3 + 3): REM

Find all the entry points
file 1... two entry points

10050 E1 = F1 +  FN PK(F1 + 5)
10060 E2 = F1 +  FN PK(F1 + 7): REM

File 2... four entry points

10070 E3 = F2 +  FN PK(F2 + 5)
10080 E4 = F2 +  FN PK(F2 + 7)
10090 E5 = F2 +  FN PK(F2 + 9)
10100 E6 = F2 +  FN PK(F2 + 11): REM

Files 3,4... one entry point each


10110 E7 = F3 +  FN PK(F3 + 5)
10120 E8 = F4 +  FN PK(F4 + 5): RETURN

63989  REM

LOADER SUBROUTINE

63990  GOSUB 63999: POKE 176,F1 /
     256: POKE 175,F1 - 256 *  PEEK
     (176): PRINT  CHR$ (4)"BLOAD
      FILE 1 NAME,A";F1: CALL  PEEK
     (175) + 256 *  PEEK (176)
63991  PRINT  CHR$ (4)"BLOAD FILE
      2 NAME,A"; PEEK (175) + 256
      *  PEEK (176): CALL  PEEK (
     175) + 256 *  PEEK (176)
63992  PRINT  CHR$ (4)"BLOAD FILE
      3 NAME,A"; PEEK (175) + 256
      *  PEEK (176): CALL  PEEK (
     175) + 256 *  PEEK (176)
63993  PRINT  CHR$ (4)"BLOAD FILE
      4 NAME,A"; PEEK (175) + 256
      *  PEEK (176): CALL  PEEK (
     175) + 256 *  PEEK (176): END

63999 F1 =  PEEK (121) + 256 *  PEEK
     (122) + 34: RETURN
```


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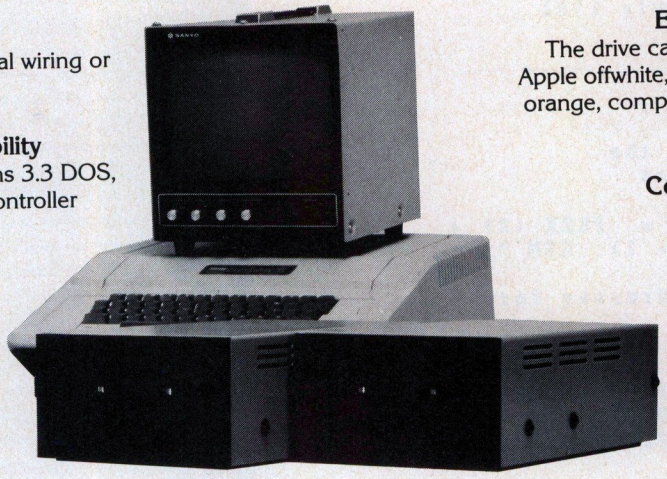

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DUAL DRIVE MASTER CREATE

David L. Deever

A nuisance problem with the DOS 3.3 MASTER CREATE program is that it insists on having the slave diskette in the same drive as the master. When I spend the bucks for a second drive I would like my software to use it effectively. The information in Worth and Lechner's *Beneath Apple DOS* on how to split MASTER CREATE into a loading segment and a writing segment (pp. 7-1,7-2) together with some searching to find the IOB table in MASTER CREATE (at $E4F) give rise to the following Integer Basic program for a DUAL DRIVE MASTER CREATE. The master diskette containing the MASTER CREATE program and the DUAL DRIVE MASTER CREATE program is the SOURCE DISKETTE. The slave diskette to be mastered is the TARGET DISKETTE.

Doing the same thing in Applesoft Basic is a bit tricky. The corresponding program would be the same except that line 10 is omitted and the commas in INPUT statemens become semicolons. However, memory from $800 up to nearly $4000 is required by MASTER CREATE. Since an Applesoft program normally begins at $801 it must be moved out of the way. There are several options. You may use the &LOMEM: utility *(Apple Orchard* Vol. 1, No. 1 or from ***Higher Text)*** or you may do a

```
POKE 103,1: POKE 104,64:
POKE 16384,0
```

before loading your program, or you may place the above statement in a small "boot" program followed by

```
PRINT CHR$(4)"RUN DUAL DRIVE
MASTER"
```

If you wish to change slot as well as drive, you should be able to POKE the slot-number * 16 (e.g., 96 for slot 6, 80 for slot 5, etc.) into 3664, but I haven't tried this.

```
]LIST

10  FOR I = 1 TO 127
20  POKE 50,I
30  PRINT "?";
40  NEXT
50  REM

 SO WHAT DID YOU EXPECT DEPT.

CHRIS VOLPE : CALL -A.P.P.L.E.
```

```
]LIST
    5 REM

  DUAL DRIVE MASTER CREATE

     by David L Deever

Call -A.P.P.L.E. : July 1982

   10 POKE 74,0: POKE 75,64: POKE
      204,0: POKE 205,64: REM
LOMEM: 16384

   20 TEXT : CALL -936
   30 PRINT "DUAL DRIVE MASTER CREATE"
      : PRINT
   40 INPUT "SOURCE DRIVE: ",S: IF
      S<1 OR S>2 THEN 40
   50 INPUT "TARGET DRIVE: ",T: IF
      T<1 OR T>2 THEN 50
   60 PRINT "BLOAD MASTER CREATE"
      : REM
BEGINS WITH CTRL-D

   70 POKE 2061,76: REM
SPLIT INTO TWO PARTS

   80 POKE 3665,S: REM
SET SOURCE DRIVE

   90 CALL 2048: REM
EXECUTE DOS LOAD

  100 POKE 3665,T: REM
SET TARGET DRIVE

  110 CALL 2093: REM
EXECUTE DOS WRITE

  120 END
```


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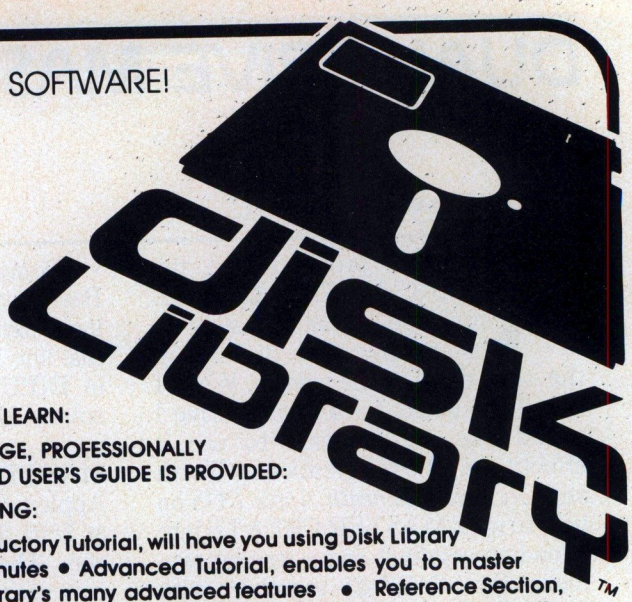

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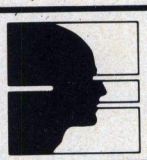

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APPLEMASH:

IN AMID$T STRINGS

Michael Thyng

ARE you still interested in MID$ and IF? To start with did you know that you don't even need MID$? That's right because we can use LEFT$ and RIGHT$. See example 4.

```
]LIST

7  REM EXAMPLE 4
10 X$ = "THE FASTIDIOUS WIND UNCO
     RKED THE MAGNUM OF BUBBLY FR
     OM THE NAPA VALLEY."
20 M1$ =  LEFT$ (X$,63)
30 M2$ =  RIGHT$ (M1$,30)
40 M3$ =  RIGHT$ ( LEFT$ (X$,63),
     30)
50 M4$ =  MID$ (X$,34,30)
200  PRINT
210  PRINT M1$
215  PRINT
220  PRINT M2$
225  PRINT
230  PRINT M3$
235  PRINT
240  PRINT M4$
```

If you had an alphanumeric variable X$ as we have in line 10, and you wanted to extract the characters "MAGNUM OF BUBBLY FROM THE NAPA," you could just use a combination of LEFT$ and RIGHT$.

There are at least two ways to do it. One way is to follow the pattern I used in line 20. After line 20 is executed, M1$ = "THE FASTIDIOUS WIND UNCORKED THE MAGNUM OF BUBBLY FROM THE NAPA." In line 30 we complete the maneuver with RIGHT$. We could have obtained the phrase we wanted in one line as shown in line 40. More conventionally we would use line 50. They all work. Sometimes in a program we are trying to locate a specific character. In example 5, we are trying to locate the middle initial for people who have written their names on a petition. Some of the people wrote their names last name first. Others wrote them first name first. Our job is to locate the initials.

What distinguishes an initial from the first letter of a name? Well, I think in this case, all initials will be followed immediately by a period. So, if I test for a period, find one and then take the character to the immediate left of the period, I should have an initial.

```
]LIST

7  REM EXAMPLE 5
10  INPUT "ENTER NAME ";NA$
20  FOR K = 1 TO  LEN (NA$)
30  IF  MID$ (NA$,K,1) = "." THEN
     100
40  NEXT K
50  PRINT "THERE WAS NO INITIAL"
60  END
100 I$ =  MID$ (NA$,(K - 1),1)
110  PRINT I$
```

In this example, the data is all input using an input statement, but certainly names could have been read in from a disk file. Line 20 sets up the parameter of the test. We want to look at every character from 1 to the full length of NA$. So, no matter how long NA$ is, the loop starting in line 20 will cover all the characters. The loop starting in line 20 will allow us to check out each of the character.

Line 30 is the promised code. Here we want to know if the current character equals a period. IF is the required word to initiate a test. MID$ is the string operation that allows us to look at the middle portion of an alphanumeric variable.

Here we are looking at one character at a time of the variable NA$. As K varies from 1 to the length of NA$, we get to test each character. If (or should I say when) we detect the period, we branch to line 100. In line 40, the switch is flipped, so to speak, for K to increase in value by 1 until K equals the number of characters in NA$. If it should happen that all the characters are tested and there is no period, then we reach the end of the FOR...NEXT loop.

When that happens, we drop through to lines 50 and 60 where we stop. Under normal conditions, where an initial and a period exist, we will get to line 100. Once there, we will capture the initial by moving one character to the left of the period (K–1).

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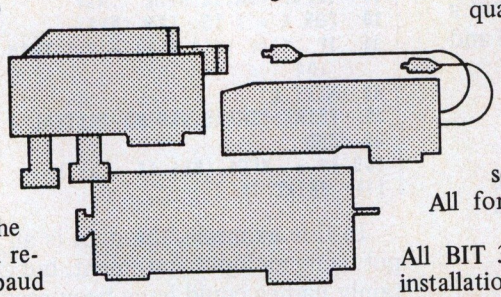

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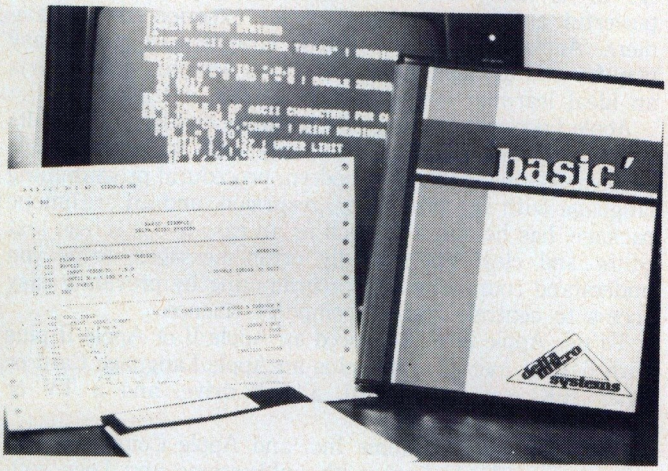


Delta Micro Systems announces the release of Basic', a supremely logical programming environment. Basic' was developed in 1980 by Dr. J.L. Schmit as an "in house" tool and was subsequently used for all new system development by Computer Assisted Analysis—the developers of Compu-Trac and Intra-Day Analyst. At the urging of many colleagues it is now being made available to the public.

Basic' — a powerful, completely structured extension of the BASIC language — is an invaluable aid to the serious programmer. Blocks of code are indicated by a unique indentation convention, eliminating the need for both extraneous statements (such as BEGIN & END) and statement numbers. Comments are right justified for ease of reading, block indentation reveals the flow of control, procedures are separated by white spaces and an extensive cross-reference is provided.

Basic' provides full documentation and a program diskette in a handy binder format. It is now available for the APPLE, IBM PERSONAL COMPUTER and TRS/80 (other versions are under development) at $129 (plus postage, handling and applicable sales tax) from Delta Micro Systems, P.O. Box 15952, New Orleans, LA 70175, (800) 535-1814.

GL-PLUS — THE MANAGEMENT TOOL FOR BETTER ACCOUNTING

Great Divide Software, Inc. has introduced a general ledger accounting system for use on the Apple /// Computer called GL-Plus. It is a flexible, easy to use, journal-based general ledger system with a PLUS. The PLUS is a built-in accounts receivable and accounts payable capacity at no extra cost!

Features include: 1) Simple operation; 2) User specified chart of accounts; 3) Instant update of all accounts as each transaction is entered; 4) Large variety of reports; 5) Reports always as current as the last entry; 5) Built-in Account Receivable and Accounts Payable; 6) Can be used with a two disk drive system or with a hard drive drive.

For most managers accounting and the preparation of financial reports has been a time consuming and sometimes costly task. But now accounting procedures can be simplified! GL-PLUS, "The Management Tool for Better Accounting" is an accounting system designed for the Apple /// computer. It is a flexible, easy to use, journal based GENERAL LEDGER system. The computer and GL-PLUS combine to provide the user with a tool which will make accounting easier. GL-PLUS guides one quickly through journal entries and then posts them. Report preparation is a "snap" because GL-PLUS does it automatically. No more long hours of "balancing the books."

The GL-PLUS system is flexible to use. It will accept a chart of general ledger accounts using a numbering system of the users choosing (between 1 and 9999). The user can use existing account names and numbers or create a new one to fit their needs. In addition, GL-PLUS can easily support accounting for multiple companies. Each company's records are kept on separate data disks or different volumes on a hard drive and each can have a different chart of accounts. A menu option allows the user to quickly switch companies.

Both accounts payable and accounts receivable are easily implemented. The user decides if and when to use either or both. Each supports a subsidiary set of company records, invoice by invoice, for all current or outstanding balances. Receipts and payments can be applied to specific invoices, including partial receipts or payments.

The GL-PLUS accounting system is written for the Apple /// computer. It requires an Apple /// and a second disk drive or can be used wiht a hard disk drive. A printer with at least a 132 column capability is recommended, however, slightly abbreviated reports can be displayed on the screen, printed on an 80 column printer or on the Apple Silentype printer.

Available from Apple Computer Dealers or Great Divide Software, Inc., 8060 W. Woodard Dr., Lakewood, CO 80227, (303) 337-0383. Suggested retail price is $495.00.

VISISCHEDULE™ PROGRAM FOR APPLE III

VisiCorp™ has made available a more powerful version of its VisiSchedule™ software program for use on the Apple® III personal computer.

The new VisiSchedule program is an interactive project management program that takes full advantage of the advanced capabilities of the Apple III. These include the 80-character, upper- and lower-case display, expanded keyboard, greater internal memory and hard-disk data storage.

Using the VisiSchedule program, a person can create an on-screen schedule of projects and tasks to increase organizational efficiency. The displayed schedule responds immediately to "what if?" changes and shows the effects of the changes on all subsequent events. The VisiSchedule program updates information on-screen when a change is initiated and incorporates all pertinent data includes costs, available staffing, resource leveling and scheduling constraints.

TOMORROW'S APPLES TODAY

Because of the larger internal memory of the Apple III, the number of tasks that can be performed is nearly double that of the version available for Apple II. A 128K Apple III computer will support from 145 to 215 tasks per project, while the 256K Apple III will support 300 tasks per project. VisiSchedule projects can be stored on the Apple III's floppy or the Profile or Corvus hard-disk system and recalled when needed.

The timechart and other reports produced by the VisiSchedule program provide valuable information to any business involved in planning projects and managing resources. Managers, executives, engineers and manufacturing personnel can profitably use VisiSchedule to track any project in which deadlines and a schedule of events are important.

The VisiSchedule program requires an Apple III computer with a minimum of 128K memory and one external disk drive (either a floppy disk drive, Corvus hard disk drive or Apple ProFile hard disk drive). A printer is strongly recommended.

The suggested U.S. price of the VisiSchedule program is $300. It will be available in July. VISICORP, 2895 Zanker Road, San Jose, CA 95134, (408) 946-9000.

CRITICAL PATH SCHEDULING THE MANAGEMENT TOOL FOR BETTER PLANNING

Great Divide Software, Inc., has announced the CRITICAL PATH SCHEDULING SYSTEM, an aid in scheduling complex projects such as those in construction, aerospace, and many other industries. It is a powerful tool for analyzing and scheduling all the tasks required to complete any multi-level project ON TIME AND AT THE LOWEST COST.

Features include: 1) Simple operation; 2) Large project capacity (over 2000 tasks); 3) Easy update of project status; 4) Large variety of reports; 5) Graphical project presentation; 6) Provision for manpower planning; 7) Can be used with a one or two disk drive system or with a hard disk drive.

The use of the CRITICAL PATH SCHEDULING SYSTEM permits proper planning to insure that ALL important tasks are included at the start of the project and provides an overview of the entire project down to the lowest level task. It does this by using the information that the operator supplies for each task and then analyzing the whole project, from start to finish. It then compiles a report that lists every task, with start and completion times and determines which tasks are MOST critical (in the scheduling sense) to the completion of the project. For each task the AUTOMATIC DATE feature generates an early start and finish date, and a late start and finish date. These dates represent the earliest a task can be expected to start and end, and the latest the task can be postponed without affecting the completion time of the project. The difference between these two dates (called the "float") is shown on the report. Also shown is "Free Float" which is the amount of time a task can be delayed without affecting any other task or the completion time of the project. Armed with this kind of information the manager is better prepared to make decisions regarding the impact any task will have on any other task or the whole project and permits him to be instrumental in guiding the project rather than just monitoring its progress.

Available from Apple Computer Dealers or Great Divide Software, Inc., 8060 W. Woodard Dr., Lakewood, CO 80227, (303) 337-0383. Suggested retail price is $495.00.

LOGO COMPUTER SYSTEMS ANNOUNCES APPLE LOGO, AVAILABLE FOR THE APPLE II

Apple Logo is an exciting interactive computer language designed to be easy to learn and use. It encourages a beginner to do many simple and interesting projects, yet is a powerful and modern language for experienced programmers. Apple Logo feature Turtle Graphics—a quick, easy way for you to create pictures on your screen. Apple Logo is an ideal learning language for children and adults.

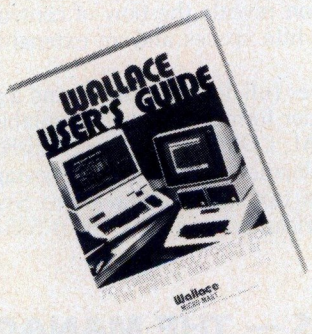
Apple Logo is a language for learning: children and adults write programs quickly and easily and acquire valuable problem-solving skills; is a modern, procedural programming language with list processing, recursion, and an arithmetic package; has helpful aids such as an easy-to-use screen text editor and clear and friendly error messages; helps you understand computers and programming by providing easy access to central ideas of computer science.

To use Apple Logo, you need an Apple II or Apple II plus with 64K of memory (48K plus an Apple Language Card or other 16K expansion card), a disk drive, and a TV or monitor.

Logo Computer Systems Inc. and Apple Computer, Inc. will support Apple Logo with publications and Logo software. Contact your Apple dealer and watch for more of our special mailings from Logo Computer Systems, Inc., 368 Congress St., Boston, MA 02210.

WALLACE MICRO-MART ANNOUNCES NEW CATALOG

Ron Wallace, President of Wallace Micro-Mart, Peoria, Illinois, recently announced the publication of his company's new catalog for Apple Computer software and accessories.



The "Wallace User's Guide" includes the latest programs and accessory items for Apple Computer system operators. The catalog, according to Wallace, currently has 1,500 items and is updated monthly with an average of 100 new items.

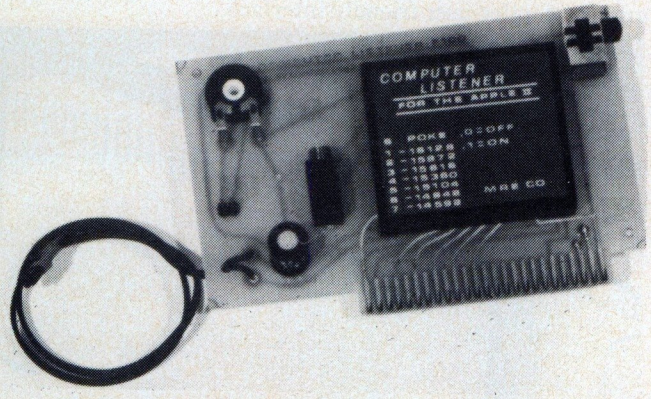
According to Wallace, the "Wallace User's Guide" can be used by corporations, dealers, clubs or enthusiasts. Plus, there are group discounts for quantity purchases. "There has been a great demand for our catalog since we began offering it," says Wallace. "This field is moving so quickly that we have to constantly update to include the state-of-the-art materials."

The catalog is available from Wallace Micro-Mart, 2619 N. University, for $5, (refundable with order).

HARDWARE:

THE COMPUTER LISTENER

The Computer Listener allows you to add a whole new dimension of sound to your programs. Now you can actually hear your Apple's internal activity just like in the movies. The Computer Listener adds sound effects to machine code games, math calculations, graphics, print statements, plotting, pokeing, listing, etc. Hear the disk save and load. All activity within the computer can be generated into unique sounds. The Computer Listener converts all the buss activity down to an audible level creating a variety of unique sounds. The internal activity is converted into a unique pulses which are then amplified and played through the Apple's Built-in speaker.



The Computer Listener can be used as a diagnostic tool to debug software and hardware problems; as a teaching device enabling the student to "see" the internal activity; or as a novelty device to give incredible arcade like sound to your programs.

SPECIFICATIONS: The Computer Listener plugs into any slot, can be activated in the software, the on board volume control adjusts loudness, plugs into Apple's built-in speaker as well as an external speaker jack, compatible with other plug-in boards.

Price $79.00. M. Reinhart Engineering Co., 4730 W. Addison, Chicago, IL 60641 (312) 286-6606.

INTELLIGENT DISK ASSEMBLY

If you're looking to add mass storage capacity to your Apple II without looking for the rich uncle to fund the enterprise, look no further. $999 is all you'll pay for our Intelligent Disk Assembly, which includes a state-of-the-art Winchester disk drive and an advanced Xebec single board controller. Add a few hundred dollars more and you'll also get the components to complete the subsystem. A highly reliable 115V/230V power module. A cable set. A host adapter personality card. Apple DOS, CP/M® or Pascal software and a component cabinet. Installation instructions and documentation make assembly simple. More important, it makes you a richer person because you do it yourself and save up to half the cost of comparable storage products.

Even if you have CPU attachments other than the Apple II, Xebec would like to hear from you. They are currently developing a whole range of small computer interfaces. For more information contact Xebec, 432 Lakeside Drive/ Sunnyvale, CA 94086. In California, call 800-672-1842, all others call 800-538-1644.

PROGRAMMABLE SERIAL I/O BOARD

A board fully compatible with current Apple® software including Pascal 1.1, Applesoft®, and Integer Basic. It provides a full EIA RS-22 DTE interface to most modems, printers and CRT terminals as well as an opto-isolated current loop interface strappable for full or half duplex, active or passive, 2-wire or 4-wire, 20mA or 60mA operation up to 200V.

On board 1K ROM software enables user programmable printer width control, delay after carriage return, automatic line-feed generation, and video display. Serial character format is user alterable with the most popular configurations set as default conditions.

Unique to the PSIO are a full range of continuously variable, programmable asynchronous data rates to 19.2 K baud; automatic recognition of the incoming data rate from a remote terminal; and firmware routines to pulse-dial calls onto the international Telex-TWX network.

Software programmable baud rates to 19200 BPS; Auto-baud: Automatic incoming baud rate recognition & matching; Telex/TWX pulse-dial function; 5-Bit baudot code, 7-Bit ASCII or 8-Bit EBCDIC capability; software break/send detect; CPU interrupt hardware/firmware. Price: $199.95. Intra Computer, 120-10 Audley Street, Kew Gardens, N.Y. 11415, (212) 947-5533.

SLOT 8 FOR APPLE II COMPUTER

— Legend Industries, Ltd. announces a space saver for Apple Computer users: Slot 8 for the Apple motherboard.

Are you finding that your Apple is overcrowded? If you need more space for your peripheral cards, consider Legend Industries as a haven for an inexpensive way to solve your problems. Legend has just introduced a product for your Apple II called "Slot 8." This product is just what the name reveals; slot number 8 for your Apple Computer.

Slot 8 is a card that plugs into slot seven and provides two (2) slots for peripheral use. Instead of slots 0-7, you now have slots 0-8!

Most of the peripheral cards for the Apple will work in slot 8, and this device is really a space saver. Price: about $50.00. Legend Industries, Ltd., 2220 Scott Lake Road, Pontiac, MI 48054.

OMNICOLOR 640 COLOR PRINTER

The Omnicolor 640 ink-jet printer provides professional quality color graphics at the lowest possible cost. Besides sharp, clear, high-resolution color graphics, the Omnicolor 640 is so quiet it can operate in any office environment.

Apple][...Apple ///...The IBM Personal Computer. Interface any of these popular computers to the Omnicolor printing system for only $4,995.

Crisp color contrast. Ink-jet technology provides excellent print quality in both the graphic and alphanumeric mode. When the Omnicolor 640 prints a solid color, it's solid.

Simplicity of operation. From screen to color copy in just a few keystrokes.

Features include: professional print quality, 64 vivid colors, low cost per copy, fast precision graphics, full-color alphanumerics, affordable, and available now from Quadram Corp., 4357 Park Drive, Norcoss, GA 30093, (404) 923-6666.

TOMORROW'S APPLES TODAY

WIZARD BUFFERED PRINTER CARD (FOR APPLE II)

The WIZARD Buffered Parallel Output (BPO) is a revolutionary new card designed to take the frustration out of normally time consuming printing jobs. With the WIZARD-BPO you will never again have to wait for your printer to finish a job before your computer is free to start on a new project. The WIZARD-BPO also unleashes all of your printer's built in capabilities... Block Graphics, Hi-Res Graphics Screen-Dumps, Full control of text formatting and page indexing. A personality ROM installed on your WIZARD-BPO tailors the operation to your particular printer. Personality ROM currently available for Epson printers, other personality ROMs available soon. Buffer sizes of 16K or 32 K available now.

The WIZARD-BPO is remarkable both for its advanced design and its ultra-reliable construction. Component leads, except for the RAMs and the firmware ROM, are all soldered directly to the board for the most reliable component interconnections. Low power consumption by the WIZARD-BPO also keeps things cool while presenting a minimum load on the power supply.

The WIZARD-BPO comes complete with a five-foot long cable for your printer, plus an owners manual that tells you how to enjoy all the BPO benefits. You also get a full two-year factory-replacement warranty from Wesper Micro Systems. 800-854-8737. Retail $179.00.

THE ONE CARD SOLUTION TO EXECUTE CP/M² APPLICATION PROGRAMS FOR APPLE II & III

APPLI-CARD™, 4 or 6 mhz Z-80 and 64K on-card memory.

The features include: CP/M available, SB-80 with card, 40 col. to 255 col. horizontal scroll, choice of application, 2K PROM on the card, real time clock available, expansion interface, upper and lower case capability, a self-contained Z-80A or Z-80B with memory, one-card Wordstar execution, 63K available for program development or execution, and menu driven set up. The prices for each product is: Wordstar APPLI-CARD, with 64K, 4mhz, Softvideo tm features SB-80 (CP/M compatible operating system), $545; Wordstar APPLI-CARD with 64K, 4mhz, Softvideo tm features CP/M is $595; APPLI-CARD with 64K, 4mhz, Softvideo tm features SB-80 (CP/M compatible operating system) is $395; APPLI-CARD with 64K, 4mhz, Softvideo tm features CP/M is $445; and Z80 Development APPLI-CARD with 64K, 4mhz, Softvideo tm features SB-80 (CP/M compatible operating system) includes PCPI-BASIC, Z80 assembler, linker is $495. These products are available from Personal Computer Products, Inc., 16776 Bernardo Center Drive, San Diego, CA 92128, (714) 485-8411.

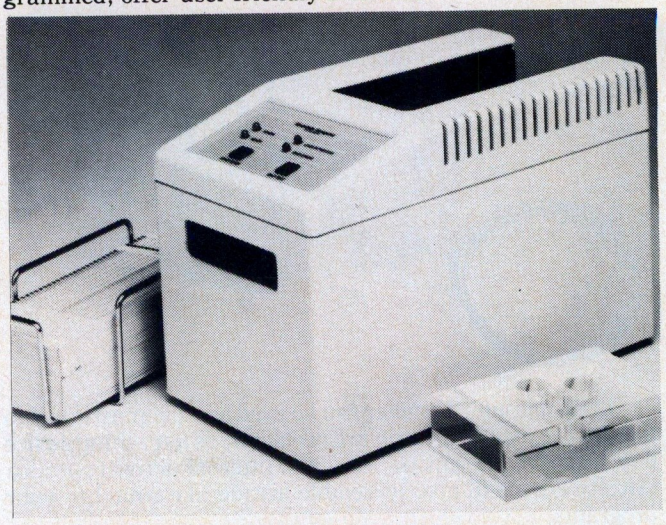
ACOLYTE

With the ACOLYTE you can have hardware control of APPLE memory and program flow. The features include: read and write to memory, trace program execution, interrupt and alter program flow, slow execution to a crawl, and halt on any program access to a specific address. All of this without stopping the program and without the program's 'knowledge' or co-operation. The price is $349.00 complete.

For more information write: Access Memory, 1701 West End Dr., Philadelphia, PA 19151.

CARDREADER FOR PERSONAL COMPUTERS

Mountain Computer Incorporated announces a low-cost, optical card reader for the personal and desk-top computer market. At $1,495.00, the MCI Model 1100A Intelligent Card Reader offers automatic card feeding with sophisticated features previously available only on much higher priced equipment. For example, the MCI Model 1100A can: read pencil marked and punched cards up to 14 inches in length, automatically feed 200 cards at a rate of 2 cards per second, distinguish marks from erasures, perform diagnostic self-test, send data remotely via a modem, provide multiple data conversion methods, including ASCII, Hexadecimal, Binary, numeric, and multiple choice grading, be remotely programmed, offer user-friendly interface.



The cost-effective MCI Model 1100A Card reader opens an exciting new world of applications for automatic data entry in the education, office and manufacturing environments. For additional information, contact: Mountain Computer, Inc., 300 El Pueblo Road, Scotts Valley, CA 95066 (408) 438-6650.

LPS II — HIGH RESOLUTION, HIGH SPEED LIGHT PEN SYSTEM

The LPS II is a true raster-scan light pen, the first ever made available for the Apple. This means that the instantaneous location of the Light Pen is determined at a full 60 cycle rate (sixty times each second), and that applications never before possible are made incredibly simple.

The Light Pen System comes with a standard software diskette in DOS 3.3 format. On the diskette is the PENTRAK driver and an entire selection of Applesoft application programs for the Light Pen, including four complete drawing programs which each take a different approach to Light Pen drawing. In addition, the interactive INSTALL utility customizes the PENTRAK driver for your particular hardware configuration, and calibrates the Light Pen to operate with your video monitor. The TYPEFACE LOADER program interactively loads supplementary Hi-Res typefaces for use in Hi-Res graphics annotation. OPART demonstrates full-screen animation on a scale never before seen on the Apple. The PENTRAK driver interfaces Applesoft programs to the Light Pen electronics. Using very simple commands, Applesoft programs can produce sophisticated interactive results with the LPS II.

The Sensor Diode in the point of the Light Pen is sensitive to the entire visible light spectrum. The Light Pen works equally well on monochrome white, green or amber monitors, and performs beautifully on color monitors and television sets of all kinds. RF modulators are no problem either. The Light Pen will function with any monitor you're currently using.

The LPS II requires an Apple II computer running Applesoft. This could be either an Apple II Plus, or an Apple II with a ROM or RAM card properly loaded. You must have at least one disk drive with DOS 3.3 proms installed in the disk controller and, of course, a video display monitor of any sort. Installation of the LPS II could not be easier; it simply plugs into an I/O slot of the Apple computer and is ready to go. While in the computer, the Light Pen does not interfere in any way with the normal operation of the system.

The LPS II includes complete user-oriented documentation taking you step-by-step from installation and calibration through basic operation and into advanced programming. The wide assortment of Application programs on the software diskette serve as additional user aids. Price is $349.00 + $5.00 from Gibson Laboratories, 406 Orange Blossom, Irvine, CA 92714.

BASIS 108, THE ALTERNATIVE

The BASIS 108 dual processor microcomputer system has features and capabilities not found in systems much more costly. But, more importantly, the system is totally compatible with the largest library of microcomputer software and plug-in peripherals available today. Its design and organization permit the BASIS 108 to be fully compatible with programs and peripherals originally developed for use with the Apple II™ microcomputer, including CP/M™-based applications software packages.

Standard features: 6502 and Z80 microprocessors; 64K RAM expandable to 128K; 2K system ROM, plus sockets for 10K additional user ROM; RGB and Composite Video; selectable 80 or 40 column text display; High Resolution Graphics: six colors, 280x192 or 280x160 with four lines of text; Color Graphics Mode: 15 colors 40x48 or 80x48; 40x40 or 80x40 with four lines of text; 8 bit parallel I/O; RS-232c serial I/O; Detached Keyboard: all standard keyboard functions, upper/lower case characters, numeric keypad, cursor control block, and 15 programmable special function keys; built-in mounting for two 5¼ inch floppy disk drives; six Apple II compatible slots for plug-in peripherals; game paddle I/O; built-in loudspeaker; two switched accessoy power outlets; mounting slots for up to six DP-25 I/O plugs. The price is $1949.00 from BASIS Inc., 23116 Summit Road, Los Gatos, CA 95030, (408) 353-1102, TWX: 910-590-8000.

A comprehensive review of the Basis 108 will appear in the August Call —A.P.P.L.E.

THE FRANKLIN ACE 100

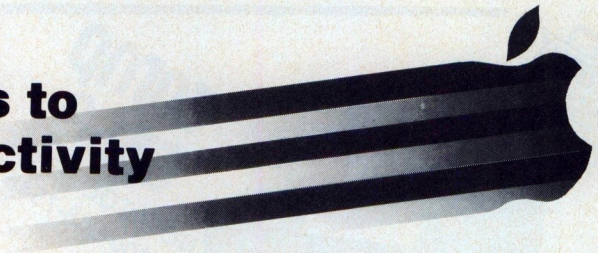
The Franklin ACE 100 is hardware and software compatible with the Apple® II. It is sweeter because it is more versatible, it includes 64K of RAM memory and—it costs less.

Any program that runs on the Apple II will run on the Franklin ACE 100. Any peripheral that works with Apple will work with ACE. The Franklin ACE 100 generates upper and lower case characters and includes a numeric pad, an alpha lock key and VisiCalc® keys.

Franklin ACE 100 features: Apple II compatible, 64K of RAM, Upper and lower case, Typewriter-style keyboard, Twelve key numeric pad, Alpha lock shift key, 50 watt power supply and built-in fan. The price is $1595.00.

For more information contact your computer dealer or contact Franklin Computer Corporation, 7030 Colonial Highway, Pennsauken, NJ 08109, (609) 488-1700.

S&H Software enables Apple][™ users to increase speed and productivity as much as 500%.



Universal Boot Initializer 4.0 works up to 500% faster than standard Apple DOS 3.3 . . . $69.95

UBI 4.0, with The DOS Enhancer,™ allows execution of BASIC and Binary programs up to 500% faster, depending on file length, and is completely compatible with standard Apple DOS 3.3 programs. For improved file management a new "FREE" command in DOS determines free space on disks.

UBI 4.0 breaks the language and time barriers between Apple][hardware and software by loading the RAM card with FPBASIC/INTBASIC (or your own program) in 1.7 seconds and by providing one-stage booting with DOS 3.3 or DOS 3.2.1 PROMS.

The UBI 4.0 package includes: training, utility, support and demo disks with complete documentation.

System requirements: 48K Apple][or][+, ROM/RAM card, DOS 3.3/DOS 3.2.1 and or more disk drives.

Amper-Sort/Merge (A-S/M) works up to 500% faster than even VisiCorp's VisiFile™ program...$52.95

The fastest "file clerk" you've ever met. Of all the sort utilities developed to manage Apple][data files, none does the job nearly so fast as A-S/M.

A-S/M can sort/merge from one to five unsorted files into a single file of up to 125K per disk.

Because sort routines can take up to 50% of computer running time in many business applications, you'll reap continuing benefits having the A-S/M "invisible speed demon" on your Apple][team -- saving 20 - 30 minutes a day of a human clerk's time spent "waiting" needlessly.

The A-S/M "speed demon" package includes: training disk and utility disks with complete documentation.

System requirements: 48K Apple][, ROM or RAM card, DOS 3.3 and one or more disk drives or 48K Apple][+, DOS 3.3 and one or more disk drives.

Available from your dealer. **Mail Order:** Send check to S&H Software, Box 5, Manvel, ND 58256. **Credit Cards:** Phone Cybertronics International Clearinghouse at 212-531-3089. (Overseas Airmail: Add $3.00 postage and handling.)

S&H Software

Box 5 Manvel ND 58256
(701) 696-2574

FILEMASTER

A DATA BASE, WORD PROCESSOR AND REPORT GENERATOR ALL COMBINED INTO ONE INTEGRATED SYSTEM.

WORD PROCESSOR

- Capitalization
  shiftlock access, displayed in inverse
- Indentation
- Insert-Delete
  characters of one or many
- Right-Left Margin Justification
  from 30 to 130 characters per line
- Variable Line Spacing
- Endless Applications
  form letters, diary, meeting notes, etc.
- Integrated with Report Generator
- Works with most any Printer
- All Instructions Visible
  instructions are displayed on the screen at all times

DATA BASE FEATURES

- Menu Driven
  instructions are visible on the screen at all times
- Up to 20 Fields per Record
- About 200 Records per File
- Up to 9 Files per Diskette
- Requires only One Disk Drive
- 48K Applesoft in ROM
- NO WRITE PROTECTION
  Use as many diskettes as you wish; make back-up copies or make modifications within the program.
- Works with most Printers
- Machine Language
  allows many of the routines to run several times faster for instantaneous response to commands while saving memory space.
- Easy Entry of Records
  enter records at any time, in any order.
- Instant Access to Records
  call all, some or one record to the screen instantly; move an entire block of records elsewhere in the file.
- Instantaneous Sort
  sorts through 1000 pieces of information per second, forwards or backwards, alpha-numerically or by number value.
- Instantaneous Search
  search a part or a whole file for a single character, a single word or a group of words.
- Divide and Merge
  divide a large file into two smaller files or merge two smaller files into one large file.
- Easy Update and Correction
  add, delete or rename files at any time; reorganize files or move an entire block of records within the file.
- Simple Mathematical Functions
  perform simple mathematical functions between fields such as payroll, checkbook, sales projections, etc.
- Field Modification
  add, delete, rename or reorganize fields at any time with ease.

REPORT GENERATOR

- Line Spacing
  single, double, triple, etc.
- Margin Spacing
- Tabulation
- Fillers
  dots, spaces, asterisks, etc.
- Fill in Preprinted Forms
- Create your own Forms
- Print Mailing Labels
  address and print form letters
- Telephone Lists
- Check Registers
- Shopping Lists
- Billing Statements
- Endless Applications
- Pre-Programmed Report Formats
  several to use at the push of a button
- Integrated with Data-Base and
- Word Processor

INCLUDES:

- 39 pages of Documentation
- Table of Contents
- Extensive Index
- One Program Diskette
- Instructions for setting up Checkbook Register and Telephone Directory
- 6½ x 9 inch Oxford Binder for handy storage of master diskette and documentation.

$149.00*

Michigan Residents add 4% sales tax.

New Dealer Prices Available.

VISA & MC call 517-337-7423

Businessmaster Inc.

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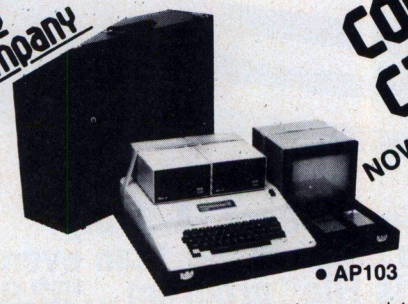
Computer Case Company



comp case

NOW TOLL FREE 800-848-7548

• AP103

Attaché style cases for carrying and protecting a complete computer set-up. Constructed of the highest quality luggage material with saddle stitching. Will accommodate equipment in a fully operational configuration along with manuals, working papers and disks. Never a need to remove equipment from case. Simply remove lid, connect power and operate.

• AP101	Apple II with Single Disk Drive	$109
• AP102	Apple II with Double Disk Drives	119
• AP103	Apple II, 9 inch Monitor & Double Drives	129
• AP104	Apple *III*, two additional Drives & Silentype	139
• AP105	12 inch monitor plus accessories	99
• P401	Paper Tiger 440/445/460	99
• P402	Centronics 730/737	89
• P403	Epson MX70 or MX80	89
• P404	Epson MX100	99
• P405	IDS 560 or Prism Printer	109
• CC80	Matching Attaché Case (5")	85
• CC90	Matching Attaché Case (3")	75
• CC91	Matching Accessory Case	95

computer case company

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by Charles R. Haight

DISKEDIT

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DOS PATCH FOR 80 COLUMN CARDS

Glen Bredon

A number of copies of BIG MAC (LC) were sent out without a DOS modification which was designed to prevent interference with 80 column cards resulting from inverse and/or flashing characters in the catalog. They also lacked a patch which enabled the control C catalog abort feature at the catalog pause point. Moreover, the disks were masters rather than slaves, so that disk boots would write over source files.

It is a simple matter to re-establish these patches on another disk. To do this, first boot your 3.3 system master disk so that a clean DOS is in memory. Type new to get rid of the Hello program. Then enter the monitor by CALL -151 and carefully enter the following data:

```
9E42:34
AE3A:F2 B6
AE1C:DD B6
B6DD:30 0A 46 32 46 32 29 3F
69 1F 49 E0 20 ED FD A9 FF 85 32
60 00
B6F2:20 0C FD C9 83 F0 01 60 4C
7F B3
```

Next type B6DDL to list the program just entered and check it with care against the listing supplied here. If it differs, it is wise to start over at the beginning.

Finally, insert a blank disk and type INIT BIG MAC. When the INIT is finished you should DELETE BIG MAC. Then you can use FID to transfer the files you wish to have on the new disk. CONFIGURE ASM could also be used to transfer the files BIG MAC and ASM.OBJ.

```
B6DD:  30  0A
B6DF:  46  32
B6E1:  46  32
B6E3:  29  3F
B6E5:  69  1F
B6E7:  49  E0
B6E9:  20  ED  FD
B6EC:  A9  FF
B6EE:  85  32
B6F0:  60

B6F1:  00

B6F2:  20  0C  FD
B6F5:  C9  83
B6F7:  F0  01
B6F9:  60
B6FA:  4C  7F  B3
  --End assembly--
```

To change the DOS on the original disk, or a copy of it, you can use a copy program that allows you to copy individual tracks, and copy just tracks 0,1,2 from the new disk you have just fixed to the original. If you do not have such a copy program, you might make it one of your projects to write one of your own. It is really not hard and is just a matter of learning how to use the RWTS routine in DOS. This is the way to learn how to do things of this sort. Just remember to thoroughly test out such a program on scratch disks before you try it on anything important.

These two patches can be used on other disks and are not specifically restricted to BIG MAC. People with 80-column cards might consider using them as part of their standard DOS. The modification at $9E42 is the change required to use a binary program as the boot program and is not related to the other patches.

It should be noted that BIG MAC makes some other patches to DOS for its own use. Thus it is important that you not try to patch any other locations in DOS for your BIG MAC disks.

```
1     ********************************
2     *                              *
3     *   DOS patches for CATALOG    *
4     *                              *
5     *   For 48K DOS 3.3 only!!!    *
6     *                              *
7     *     G. Bredon    1/1/82      *
8     *                              *
9     ********************************
10    *                              *
11    *    Also make:                *
12    *                              *
13    *    AE3A: F2 B6               *
14    *    AE1C: DD B6               *
15    *                              *
16    *    Modification of the       *
17    * addresses of these routines  *
18    * may interfere with proper    *
19    * operation of BIG MAC!!!      *
20    *                              *
21    ********************************
22
23
24    INVFLG    =     $32
25    COUT      =     $FDED
26    RDKEY     =     $FD0C
27    FMDONE    =     $B37F       ;Exit routine from file mngr
28
29              ORG   $B6DD       ;Ok only for DOS 3.3
30
31    ********************************
32
33              BMI   GCOUT       ;Treat - chr as usual
34              LSR   INVFLG      ;Kill 2 high bits of INVFLG
35              LSR   INVFLG
36              AND   #%00111111  ;Inv & flash -> uc
37              ADC   #$1F        ;Carry is set
38              EOR   #$E0
39    GCOUT     JSR   COUT        ;Let COUT handle inverse
40              LDA   #$FF        ;Reset INVFLG to normal
41              STA   INVFLG
42              RTS
43
44              BRK
45
46              JSR   RDKEY       ;This must ORG $B6F2
47              CMP   #$83        ;Control C at catalog pause?
48              BEQ   ABORT       ;Skip rest if so
49              RTS               ;Otherwise send rest of cat
50    ABORT     JMP   FMDONE      ;Aborts catalog routine
   32 bytes     Errors: 0
```

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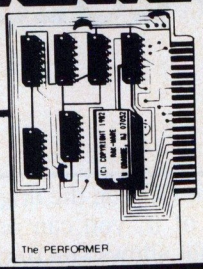

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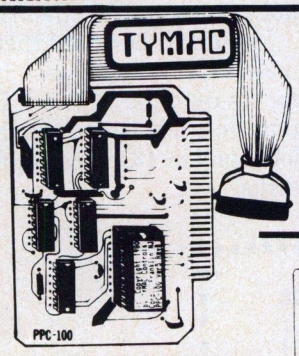

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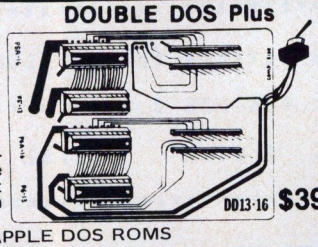

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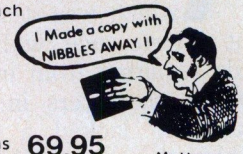

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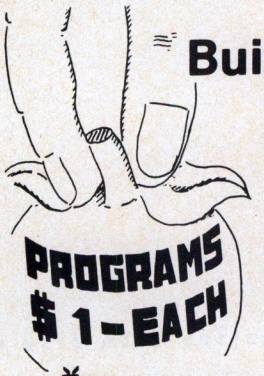

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BINARY TO TEXT CONVERTER

Val J. Golding with Dave Lingwood

LEAVE it to Lingwood is a favorite saying around our neck of the woods. Dave, needing to transmit a binary file to us via a modem and the phone, devised the basis for this short utility. While one can, with a bit of determined effort, transmit binary files over the phone, it is usually far simpler to handle a text file, the file type most terminal programs expect to find.

Apple's monitor has a "hex dump" routine that prints a memory address in hex followed by a dash and eight bytes of data, each separated by a space. This is what you see when you enter monitor and type, for example, 300.308.

Even though Dave's gem did its job, when we got our hands on it, we spotted an additional use to which it could be put, to save a binary file as text, then EXEC the file into memory. Only three things need be done, we replace the monitor's dash with a colon, add an opening line to the text-file to CALL -151, and add a closing line to return to BASIC. Since these are optional features, they are shown in the BASIC listing only as REMs. Should you wish to use them, just remove the REM from the statement.

Another innovative feature we would like to suggest our readers study and perhaps improve upon, is the method of loading the binary code in memory. This converts the decimal starting address to HEX characters that the Lam routine can use, limited to one byte. Thus it could be used only for short programs using memory up to $CFF.

The BASIC program is set up to place the machine code in memory using the S. H. Lam routine, so all you need do is type it in and fire away. The Assembly listing is provided for those that wish to explore the program more fully.

```
0300: AD 72 AA
0303: 85 00
0305: 18
0306: 6D 60 AA
0309: 48
030A: 85 02
030C: AD 73 AA
030F: 85 01
0311: 6D 61 AA
0314: 85 03
0316: 68
0317: D0 02
0319: C6 03
031B: C6 02
031D: 38
031E: B0 06

0320: A5 00
0322: 29 07
0324: D0 13

0326: A4 01
0328: A6 00
032A: A9 8D
032C: 20 ED FD
032F: 20 40 F9
0332: A0 00
0334: A9 BA
0336: 20 ED FD

0339: A9 A0
```

```
2     ********************************
3     *                              *
4     * Routine to save binary data  *
5     * and addresses to a text file *
6     *                              *
7     * Stolen from Apple's monitor  *
8     * by D. Lingwoood/V. Golding   *
9     *                              *
10    * This code fully relocatable  *
11    *                              *
12    * Call -A.P.P.L.E. : July 1982 *
13    *                              *
14    ********************************
15    *
16    STADR    =    $00
17    NDADR    =    $02
18    BLEN     =    $AA60
19    BSTART   =    $AA72
20    PRNTYX   =    $F940
21    PRBYTE   =    $FDDA
22    COUT     =    $FDED
23    *
24    *
25              ORG  $300
26    *
27    *
28              LDA  BSTART      ;Get start addr from DOS
29              STA  STADR       ;Save it
30              CLC
31              ADC  BLEN        ;Add the length
32              PHA              ;Check later
33              STA  NDADR       ;and save it
34              LDA  BSTART+1    ;Now do same for hi byte
35              STA  STADR+1
36              ADC  BLEN+1
37              STA  NDADR+1
38              PLA
39              BNE  LOWONLY
40              DEC  NDADR+1
41    LOWONLY   DEC  NDADR       ;Fix DOS goof
42              SEC
43              BCS  PRA1        ;Unconditional branch
44    *
45    MOD8CHK   LDA  STADR
46              AND  #$07
47              BNE  DATAOUT
48    *
49    PRA1      LDY  STADR+1     ;Output routine starts here
50              LDX  STADR
51    PRYX2     LDA  #$8D
52              JSR  COUT        ;Print a [C/R],
53              JSR  PRNTYX      ;memory address
54              LDY  #$00
55              LDA  #":"        ;and a colon
56              JSR  COUT
57    *
58    DATAOUT   LDA  #"          " ;Space
```

BINARY TO TEXT CONVERTER

```
0338:  20 ED FD            JSR  COUT         ;Output the space
033E:  20 DA FD            JSR  PRBYTE       ;Output byte in hex
0341:  A5 00      NXTA1    LDA  STADR        ;Increment 2 byte start addr
0343:  C5 02               CMP  NDADR
0345:  A5 01               LDA  STADR+1      ;and compare to 2 byte end addr
0347:  E5 03               SBC  NDADR+1
0349:  E6 00               INC  STADR        ;(Carry set if >=)
034B:  D0 02               BNE  MOD8
034D:  E6 01               INC  STADR+1
034F:  90 CF      MOD8     BCC  MOD8CHK      ;Ready for next addr?
0351:  60                  RTS               ;Back to BASIC
--End assembly--          82 bytes           Errors: 0
```

```
]LIST

10  REM

"        BINARY TO TEXT SAVE

by Dave Lingwood & Val J Golding

  Call -A.P.P.L.E. : July, 1982

100  HOME : VTAB 4: PRINT "      H
     EX LIST TO DISK": PRINT
110  GOSUB 800
120 D$ =  CHR$ (13) +  CHR$ (4)
130  INPUT "FILE TO COPY ? ";F1$:
      INPUT "SOURCE DRIVE (1/2) ?
     ";D1$: ON  NOT  VAL (D1$) OR
      VAL (D1$) > 2 GOTO 130: IF
     F1$ = "" THEN  PRINT D$"CATA
     LOG": GOTO 130
140  PRINT D$"BLOAD"F1$",D"D1$
150  INPUT "TARGET DRIVE (1/2) ?
     ";D2$: INPUT "FILENAME TO SA
     VE ";F2$: ON  NOT  VAL (D2$)
      OR  VAL (D2$) > 2 GOTO 150:
      IF F2$ = "" THEN 150
160  PRINT D$"MONCIO"D$"OPEN"F2$"
     ,D"D2$D$"WRITE"F2$
170  REM  PRINT"CALL-151"
180  CALL BP * 256: REM
M/L start address

190  PRINT
200  REM PRINT"3D0G"
210  PRINT D$"CLOSE": END : REM

800 X$ = "0123456789ABCDEF"
900 BP =  PEEK (110) + 2: FOR I =
     1 TO BP:H$ =  MID$ (X$,I + 1
     ,1): NEXT : REM

Find free space pointer, convert
address to hex, stuff in string

910 H$ = H$ + "00:AD 72 AA 85 0 1
     8 6D 60 AA 48 85 2 AD 73 AA
     85 1 6D 61 AA 85 3 68 D0 2 C
     6 3 C6 2 38 B0 6 A5 0 29 7 D
     0 13 A4 1 A6 0 A9 8D 20 ED F
     D 20 40 F9 A0 0 A9 BA 20 ED
     FD A9 A0 "
920 H$ = H$ + "20 ED FD B1 0 20 D
     A FD A5 0 C5 2 A5 1 E5 3 E6
     0 D0 2 E6 1 90 CD 60 ND9C6G"

930  FOR I = 1 TO  LEN (H$): POKE
     511 + I, ASC ( MID$ (H$,I,1)
     ) + 128: NEXT : POKE 72,0: CALL
      - 144: RETURN : REM

Stuff machine code into memory
using Lam routine
```


$$

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MOVING BIG MAC SYMBOL TABLE

Thomas G. Williams

THE Symbol Symon symbolic debugger is a major improvement over the capability included in the Apple][monitor. Unfortunately, it does not know about the Big Mac.LC assembler and thus can not save or use the symbol table produced by Big Mac.LC. Symbol Symon can be used without a symbol table, but you lose the capability to refer to locations by name instead of address. Fortunately, the Big Mac.LC symbol table is in the same format as the Big Mac.STD symbol table, which Symbol Symon can use. If the Big Mac.STD symbol table is moved to where Big Mac.STD would have put it, and if certain memory locations are set to values that Big Mac.STD would have set, Symbol Symon can find and use the symbol table.

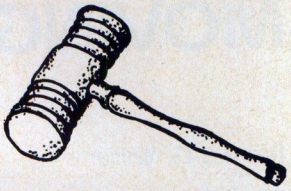
When the Symbol Symon "Save Symbol Table" option is selected, Symbol Symon checks locations $8BC–$8C0 for the sequence $02,$09, $07,$20,$0D ("BIG M" in inverse video). If it finds this sequence, it assumes that Big Mac.STD was used and takes the two byte datum stored at $80D,$80E as the address of the last byte of the assembler source file. Big Mac.STD starts the symbol table immediately after the source file.

Big Mac.LC puts the symbol table on the language card in bank one of $D000–$DFFF. This program is for use with assembly language programs where all of the symbol table will fit into this space. It moves the data from bank one of $D000–$DFFF to $7000–$7FFF. It then puts the proper values on $8BC–$8C0 and sets $80D–$80E to $6FFF. Thus the Symbol Symon "Save Symbol Table" option will think Big Mac.STD was used and save the data starting at $7000. This program always moves 4096 bytes; it makes no attempt to identify the end of the symbol table. This works fine because Symbol Symon can identify the end of the table and will not save extraneous data.

To use the program, BRUN it after the assembly is complete but before Symbol Symon is started. As given here, it runs in page 3 of memory. Neither Big Mac.LC nor Symbol Symon uses page 3, so if the program you are debugging does not use page 3, this program will not be disturbed, and can be executed by a CALL 768 after exit from Big Mac.LC.

```
:ASM
                        ********************************
                        *                              *
                        * MOVE BIG MAC.LC SYMBOL TABLE *
                        *       by  Tom Williams       *
                        *                              *
                        * Call -A.P.P.L.E. : July 1982 *
                        *                              *
                        * Move Big Mac.LC Symbol table *
                        * to where it would be if      *
                        * assembled by Big Mac.STD so  *
                        * SYMBOL SYMON can find it.    *
                        *                              *
                        * Move bank 1 $D000-DFFF to    *
                        * $7000-$7FFF. Put $6FFF (end  *
                        * of source) in $80D-80E. Put  *
                        * proper values in $8BC-$8C1.  *
                        *                              *
                        ********************************
                        *
                        * Equates
                        *
                        A1L       EQU  $3C
                        A1H       EQU  $3D
                        A4L       EQU  $42
                        A4H       EQU  $43
                        ENDSRC    EQU  $80D        ;End of source
                        CHKLOC    EQU  $8BC        ;Loc'ns checked by SS
                        *
                        *
                                  ORG  $300
                        *
                        * Move symbol table
                        *
0300: 2C 88 C0          START     BIT  $C088       ;Select RAM read, bk 1
0303: A9 00                       LDA  #0          ;Set up src, dest ptrs
0305: 85 3C                       STA  A1L
0307: 85 42                       STA  A4L
0309: A9 D0                       LDA  #$D0        ;Source
030B: 85 3D                       STA  A1H
030D: A9 70                       LDA  #$70        ;Destination
030F: 85 43                       STA  A4H
0311: A0 00                       LDY  #0          ;Clr Y for indir addr
0313: B1 3C             LOOP      LDA  (A1L),Y     ;Get Datum
0315: 91 42                       STA  (A4L),Y     ;Store Datum
0317: E6 3C                       INC  A1L         ;Increment pointers
0319: E6 42                       INC  A4L
031B: D0 F6                       BNE  LOOP
031D: E6 3D                       INC  A1H         ;Must increment hi byte
031F: E6 43                       INC  A4H
0321: A5 3D                       LDA  A1H         ;Check if done
0323: C9 E0                       CMP  #$E0
0325: D0 EC                       BNE  LOOP
                        *
                        * Move finished, set end of source pointer
                        *
0327: A9 FF                       LDA  #$FF
0329: 8D 0D 08                    STA  ENDSRC
032C: A9 6F                       LDA  #$6F
032E: 8D 0E 08                    STA  ENDSRC+1
                        *
                        * Set up locations checked by SYMBOL SYMON
                        *
0331: A2 04                       LDX  #4
0333: BD 40 03          LOOP1     LDA  CHKDATA,X
0336: 9D BC 08                    STA  CHKLOC,X
0339: CA                          DEX
033A: 10 F7                       BPL  LOOP1
                        *
                        * Reset to ROM read
                        *
033C: 2C 81 C0                    BIT  $C081
033F: 60                          RTS
                        *
                        * Data checked by SYMBOL SYMON
                        *
0340: 02 09 07
0343: 0D                CHKDATA   HEX  02,09,07,0D
 --End assembly--          68 bytes     Errors: 0
```

A.P.P.L.E. MEETING MINUTES



Michael Thyng/guest secretary

May 18, 1982
Computer Empire

VICE President Bob Huelsdonk called the meeting together at 7:33 PM, sixty five members were present.

Old Business:

A.P.P.L.E. office hours are extended to 7:00 PM on Thursday evenings. An informal show of hands indicated that 95% of the members currently receive *Softtalk*. No further news about the possibility of A.P.P.L.E. sponsoring subscriptions. It is still under investigation. There were some questions on the results of the user survey. Some asked when it would be published. David Lingwood was unavailable for comment.

New Business: None.

Committee Reports:

Mike Thyng reported that there were many volunteers for the Pacific Science Center and A.P.P.L.E. co-sponsored, first annual Apple Computer Festival. He said there were members coming in from Seattle, Tacoma, Bend, Eugene, Bremerton, and Washougal to participate. There were visitors coming from Canada. Others were encouraged to participate.

Other Reports:

Val Golding gave a first-hand account of his impressions of the Boston Applefest. He said that Boston had improved its facilities from a four aisle show last year to a fourteen aisle extravaganza this year. He saw only a few new products. Among them, a new Z-80 card which features on-board 64K RAM and your choice of a four or six mhz chip. Val thought it ran faster than Microsoft's Z-80.

The star of the show seemed to be the first ever high resolution light pen. This comes with a $349.00 plug-in card. The Franklin Ace 100 - a dual processor, Apple similar computer - was displayed. XEBEC demonstrated an Apple compatible hard disk. The 5¼ inch five megabyte storage device sells for about $1300.00

A.P.P.L.E. picked up about 85 new members. We adjourned the formal business portion of the meeting at 7:50.

Speaker:

Tom Benett of the University of Washington Academic Computer Center spoke to us about communicating over phone lines to a large host computer. Tom is the Terminal Services Coordinator at the "U." He told us that to talk to the university's computer - which is a mainframe CDC Cyberg 170-750, a 60 bit word machine - you needed three things.

1) Hardware interface; the RS232-C
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Rates are very low for non-commercial users. To sign up to use this system or to get more information, you may call Tom at (206) 543-5970. Tom left us with a thought that microcomputer owners should carry into the '80's. "The best way to compute is to let the microcomputer do what it does best and let the mainframes do what they do best."

Q & A

There were questions about the rumors of new Apple computers, why a system would not boot up, comments about the large capacity boards that simulate disk drives without diskettes, and a comment that one piece of software called *Crunch* correctly removed REM statements, but then went ahead and removed some semi-colons too.

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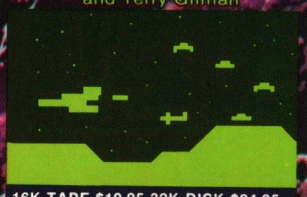

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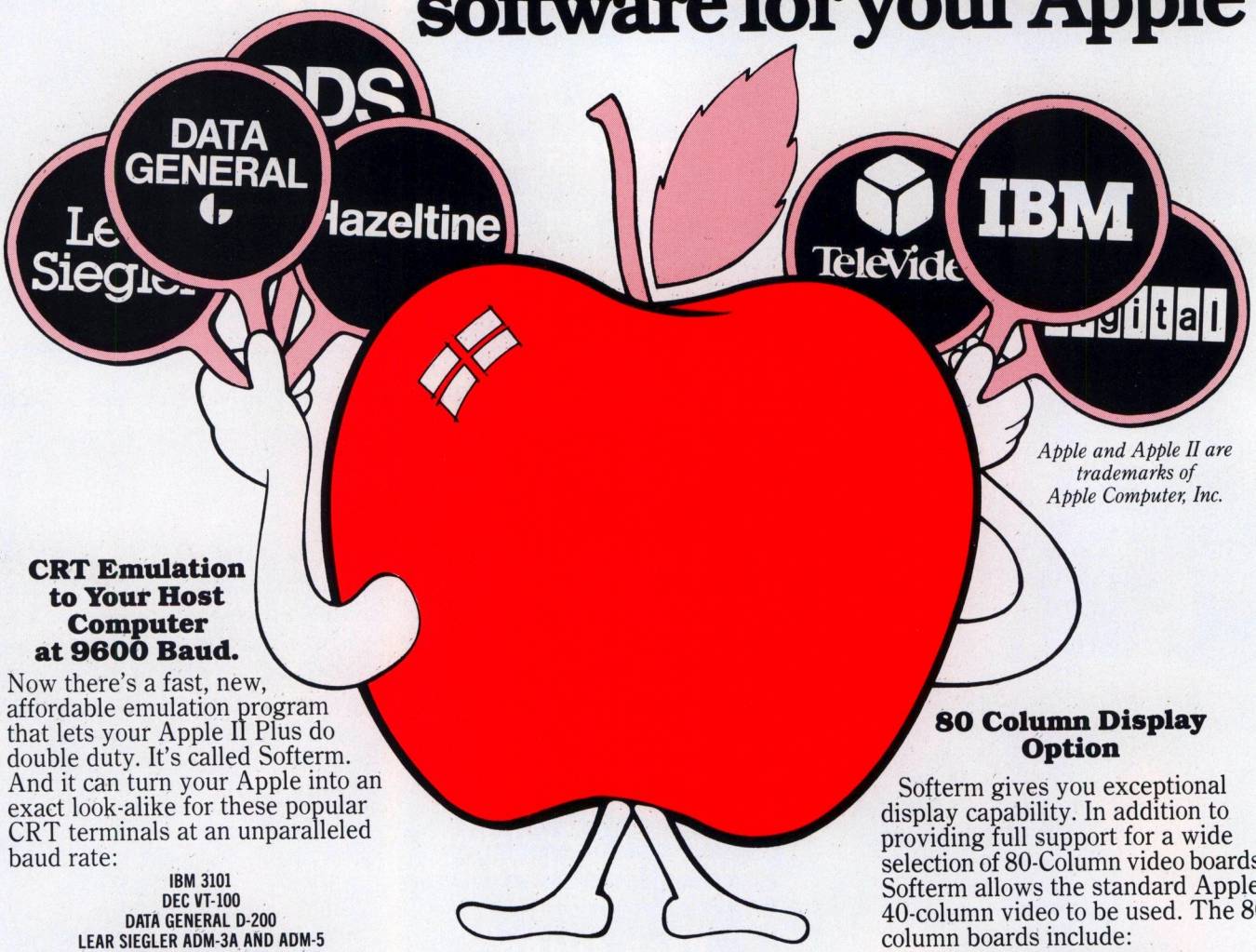

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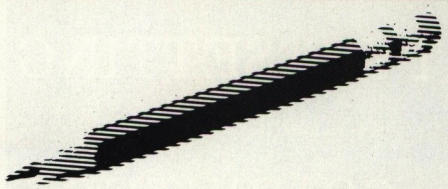

The Readers

Dear Val,

HAVING recently programmed a C.A.I. package containing several educational games, I noticed that one of the games exhibited a flaw when invoking the random (RND) function. The game was a variation on the wordgame "Hangman," and the mystery words were chosen from a data array "randomly." I use this word metaphorically only, as it seems that the choice was not so random at all. After trying out the program repeatedly—it seemed that every time you began to play the game anew, the same words tended to come up first.

Upon complaining of this to a friend who programs for a C.A.I. company, he told me there was a bug in the Applesoft RND function and that there was a simple fix for it! (namely POKE 205,255) I happily tried out the fix only to see the problem persist!

I narrowed it down to this observation: when using the RND function from a cold start (power up situation), the Apple will always give you the same sequence of random numbers. Later I learned that the random number generator can be seeded to produce a certain sequence over and over. While this is useful in some gaming situations (replaying of card hands, for example) it was totally in the way for my application!

What I wanted was a relatively random selection from my mystery list of words, even upon cold power on situations! If each time the player booted-up, he/she faced the same sequence, then the game took on a truly boring character. Obviously the random generator is seeded with some value upon booting, and I could always place whatever value I wanted in the program to reseed the generator — but how would I get a random seed value out of a cold methodical Apple???

It seems that most of the literature on the RND function concentrates on the problem of degeneration — i.e. that after prolonged usage, the RND function will tend to get less and less random producing a pattern of numbers. This has been discussed in David Lingwood's Amplifying Applesoft *(Call -A.P.P.L.E. in Depth #1),* and also just recently in the May issue of *Call -A.P.P.L.E.* (in David Sparks' article: Random Adventures). His discussion of seeding is, I believe, misleading. He stated that "Seeding Basic's function is simply a matter of POKEing locations $4E and $4F."* This is not exactly correct. It is *not* what he did himself in his BASIC program examples (page 49). He seeded the RND function by PEEKing these locations and using that value as a negative argument to seed the generator sequence! In fact the generator can be seeded by any negative argument as explained in the Basic Programming Reference Manual for Applesoft (page 159).

I would refer fellow readers to a past issue of *Call -A.P.P.L.E.* (February 1981, page 24) where Tom Crawford came up with a clever solution for the non-random RND function. He refers to these same locations ($4E and $4F) as a "counter" which is always being updated whenever the Apple is awaiting keyboard input. PEEKing these locations gives one a value between 0 and 65535. PEEKing only one of these locations will give you a single byte between 0 and 255 which may be enough as we will see.

The idea is simply to use the value in this counter to determine the end point of a random loop. When the loop is exited, you will be at a relatively random spot in the not so random sequence that the Apple has generated with its initial seed value. The key is to have areas in your program before calling the RND function where the program awaits a user's input, or whatever from the keyboard (even if only to read the title!).

Then you will have some random values at these two locations... Now the rest is easy! Once I understood this, it was simple to apply Crawford's solution to generate a more random sequence for my word list in my game.

I hope other readers who have a similiar need for a random sequence will benefit from the use of this counter value held in locations $4E and $4F. It is an easy way out of the cold boot sequence problem about which the definitive word has I'm sure not yet been heard!!

By the way, I enjoyed experimenting with David Sparks' random test in Applesoft using Hi-Res! I ran these tests on the random function with no seeding, with a seed of -1 and with selected negative seeds. I also tried Dr. Norman Holthouse's routine (from D. Lingwood's article). After about 25000 generations, there was no great difference in the distribution of numbers being selected. I did notice a difference between using the RND function and Holthouse's algorithm. This routine was written in BASIC and hence much slower than the call to the Applesoft RND function. Besides that difference, Holthouse's routine generated a specific pattern spread on the Spark's black hole test after only a few hundred calls. I don't know what to make of the pattern exactly, perhaps some other curious reader might delve into the issue. I haven't tried David Sparks' assembly routines yet as I don't dabble in machine language. In any case my problem was solved by that back issue of *Call -A.P.P.L.E.* with Crawford's suggestion. Thanks Tom, David, and David... for the learning experience — and may you all have *truly Random* adventures!!

Marc Weiner
11642 Kiowa Ave. apt.9
Los Angeles, CA 90049

** Sparks was here referring to Integer Basic, not Applesoft. ...ed*

Dear Val,

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Call -A.P.P.L.E. encourages software manufacturers to advise us of policy changes in re to unprotecting disks.

Dear Val,

There is a small typo in my "So What Did You Expect" on page 70 of the May Call -A.P.P.L.E.

Line 50 should read:

50 FOR K = T TO B STEP 2

There there is no need to add line 55. Hope this helps the readers out there.

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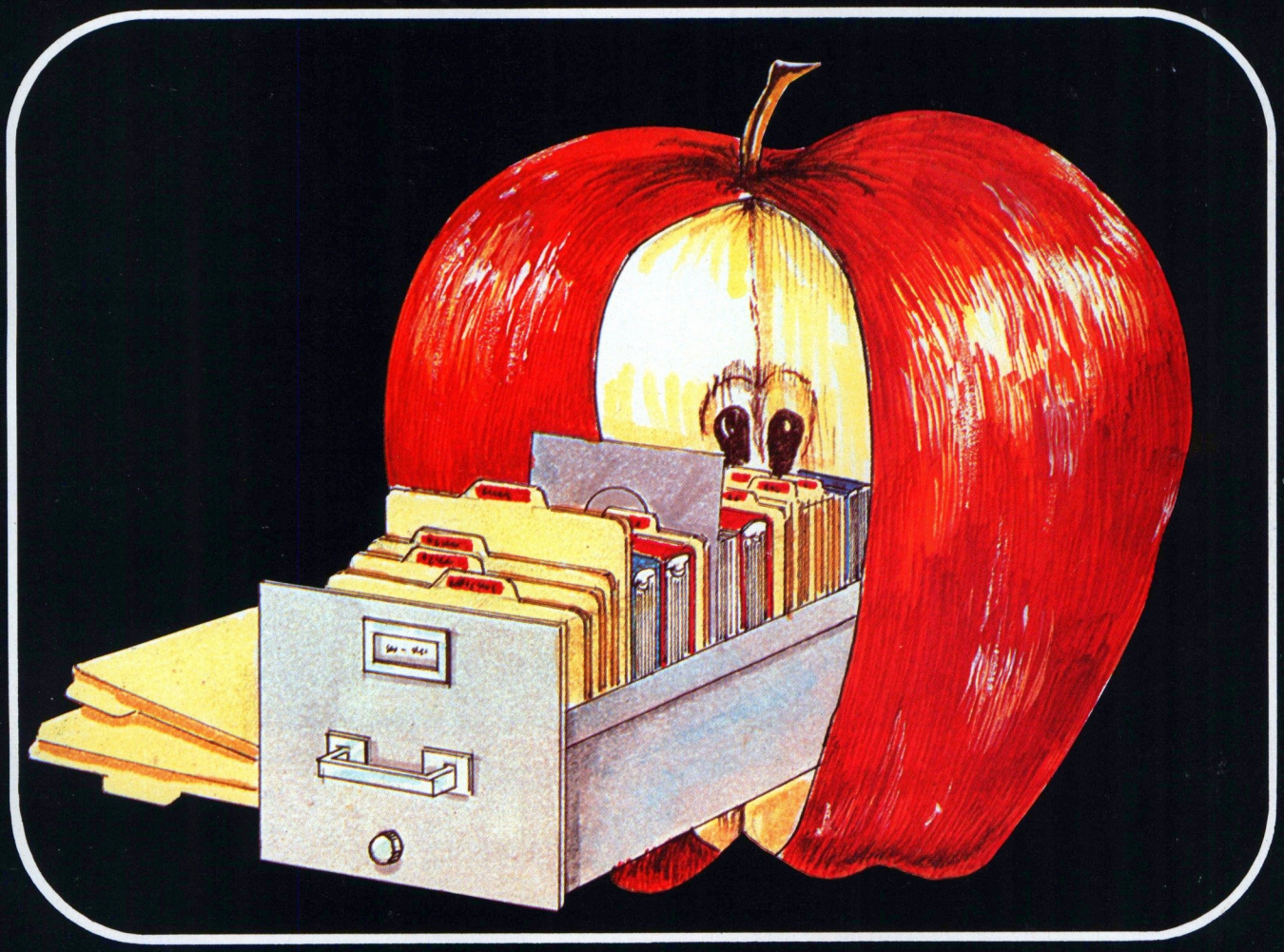

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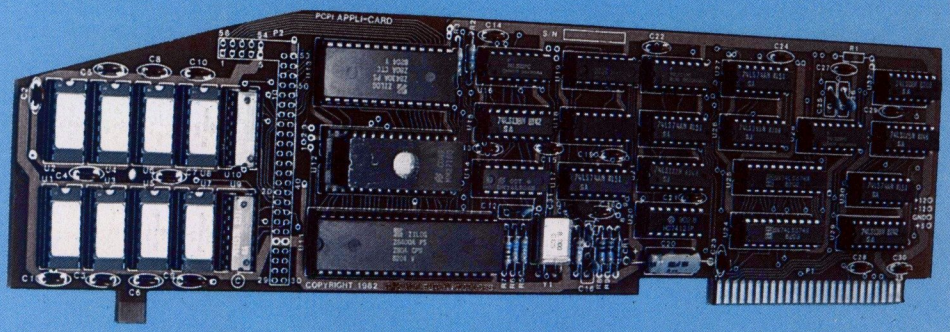

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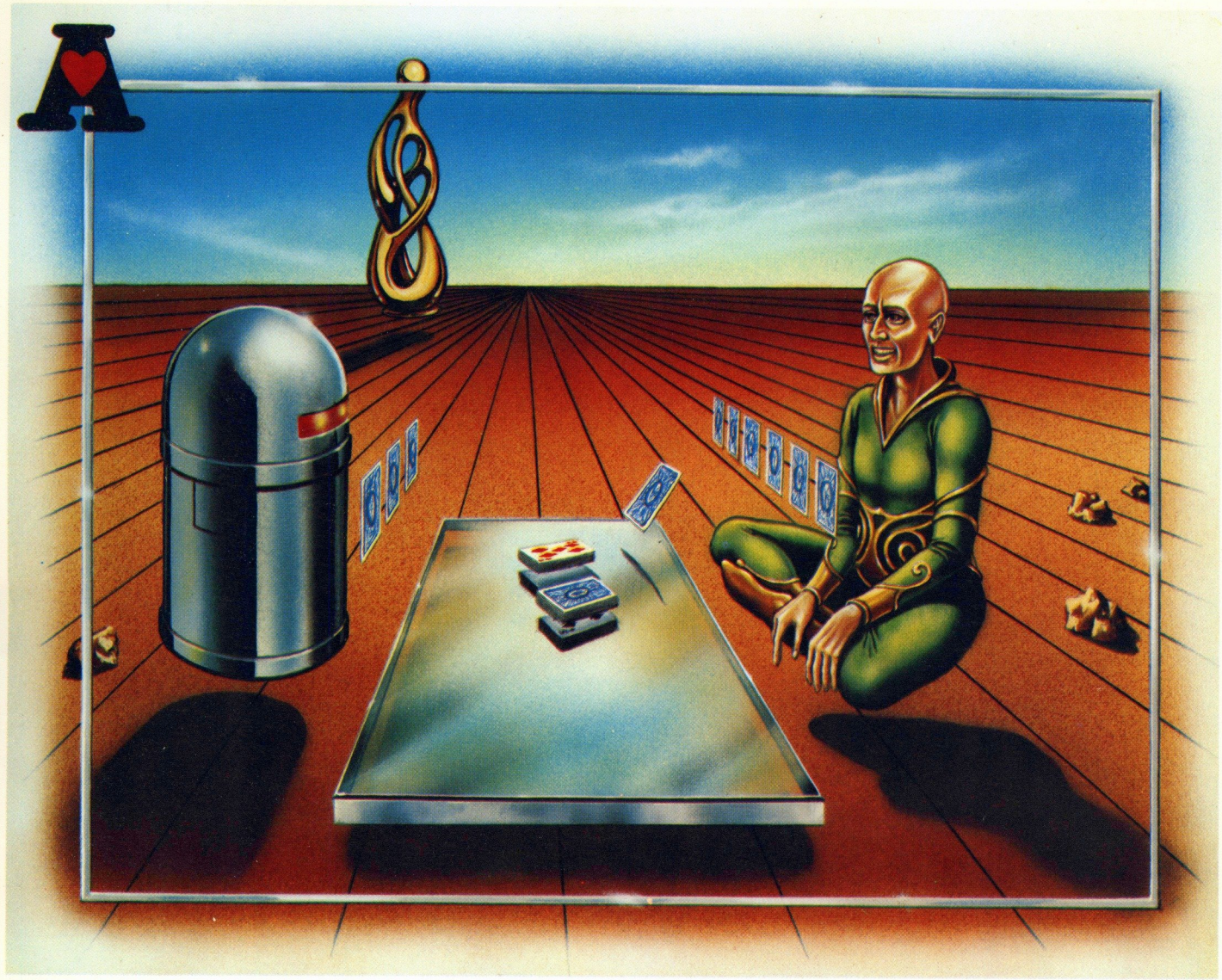

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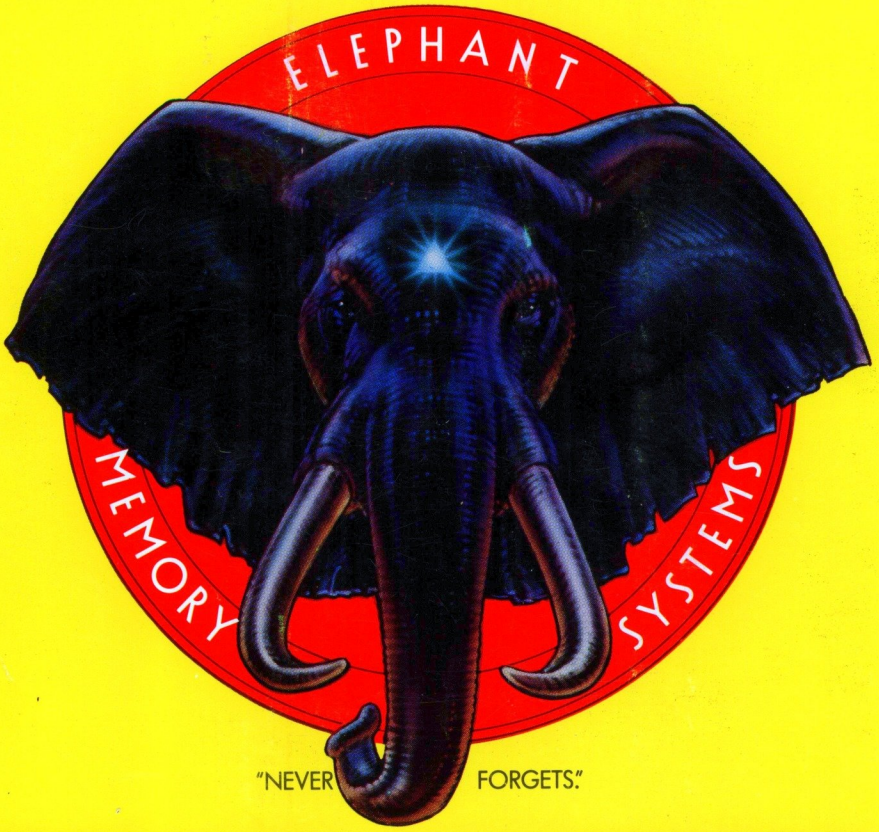

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